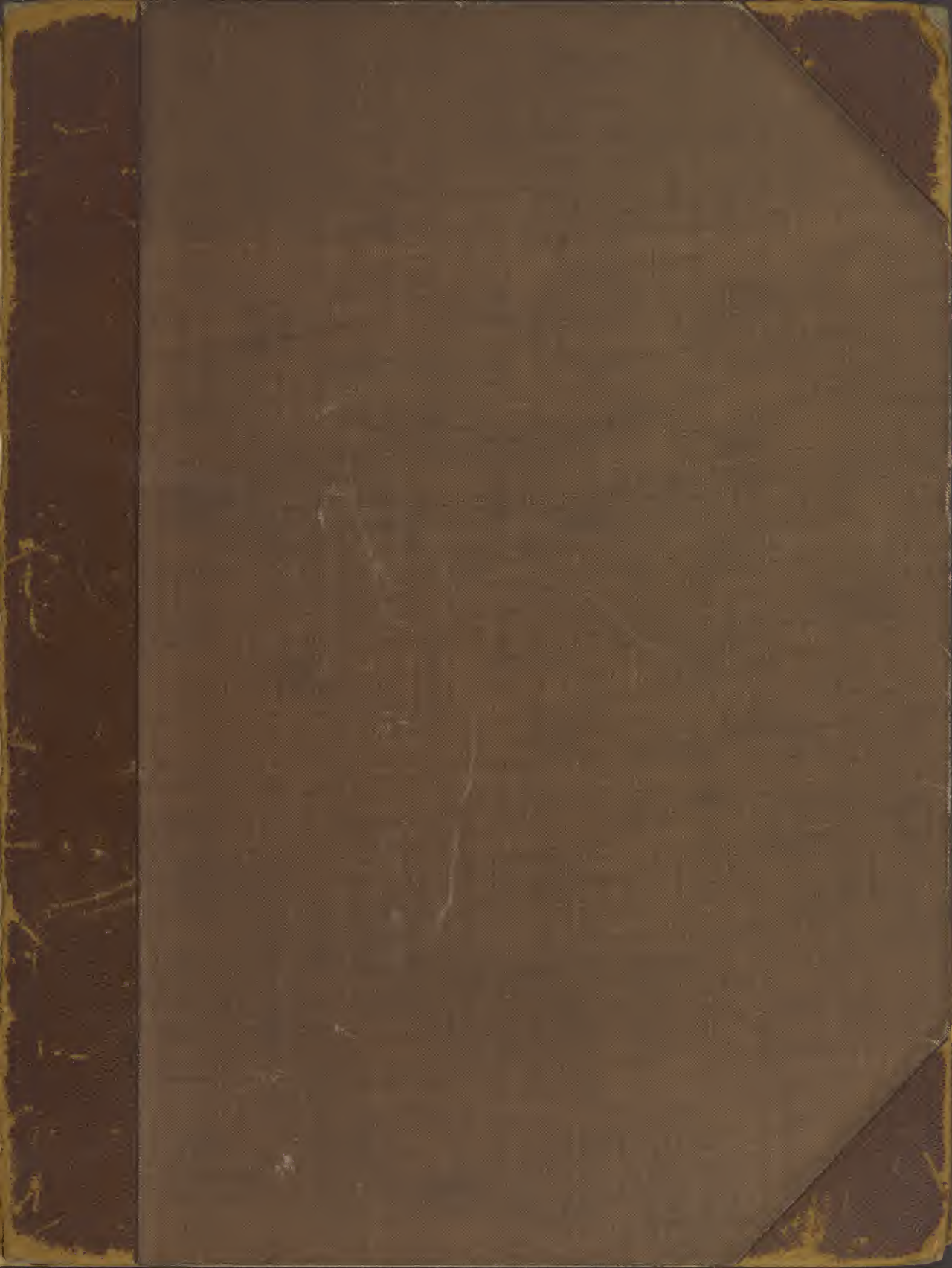


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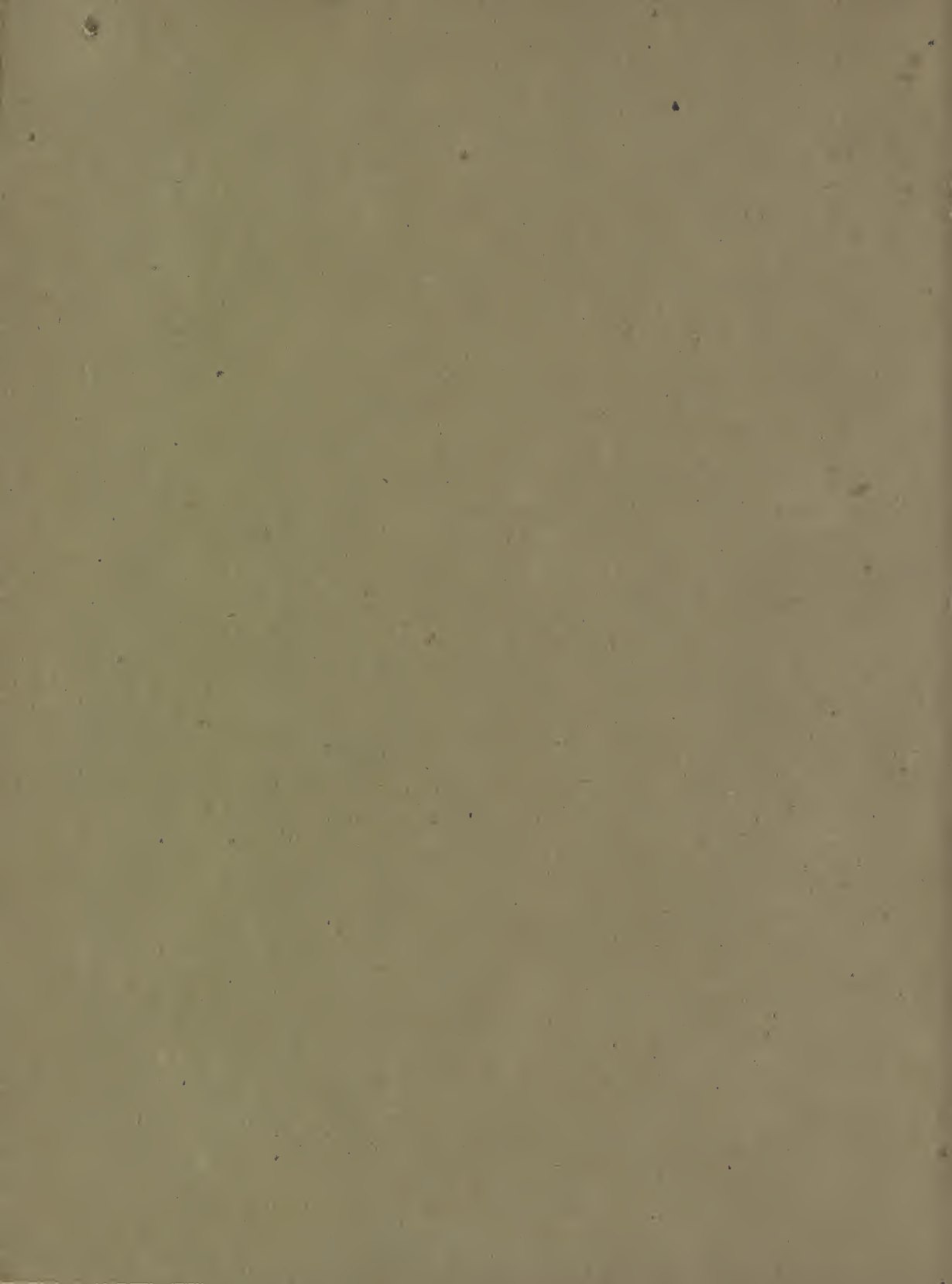
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Part I.

BUTTERFLIES
OF
HONGKONG
AND
SOUTH-EAST CHINA.

J. C. KERSHAW, F.E.S., F.Z.S.



香江蛺蝶談

BUTTERFLIES

OF

HONGKONG

BY

J. C. KERSHAW, F.E.S., F.Z.S.

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J. C. Kershaw del.

HENTSCHEL, COLOURTYPE.

PLATE I.

1. DANAIS (CADUGA) SITA, *Kollar.*
2. DANAIS (CADUGA) MELANEUS, *Cramer.*
3. DANAIS (TIRUMALA) LIMNIACÆ, *Cram.*
4. DANAIS (TIRUMALA) SEPTENTRIONIS, *Butler.*
5. DANAIS (RADENA) SIMILIS, *Linnaeus.*
6. DANAIS (LIMNAS) CHRYSIPPUS, *Linn.*
7. DANAIS (ANOSIA) ARCHIPPUS, *Fabricius.*
8. DANAIS (SALATURA) PLEXIPPUS, *Linn.*



PREFATORY NOTE.

Though within the Northern Tropic, Hongkong, Macao and the adjacent country exhibit little of the luxuriance of vegetation usually associated with a tropical climate. This, however, is owing to the district being burdened with a poor and dense population, who destroy the vegetation and gather up the mould-forming materials for fuel. The climate for the greater part of the year is hot and damp; the landscape chiefly rain-swept, sun-burned hills, intersected by valleys mostly cultivated as wet rice-fields, but with patches of sweet potato and other vegetables, whilst dirty, crowded villages lie in every direction at the foot of the hills. Most of these are very barren, some boulder-strewn and scantily covered with coarse grasses and stunted undergrowth, others scattered over with the small fir common on the hills of S. China. Here and there, chiefly at the back of the villages or on isolated hills specially devoted to the ever-present horseshoe graves, are small clumps of trees and bushes continually lopped and hacked by the villagers, except the few, generally banyans, preserved as "joss" trees, the trunks bedaubed with red papers and the usual dirty and tawdry paraphernalia arranged on a delapidated altar beneath their shade. A few of the Buddhist monasteries, however, are sheltered by really fine forest trees.

Birds and insects are almost the only wild fauna which are conspicuous in the countryside, but the birds numerous enough to make much show are few in species, three kinds of *Pycnonotidæ* or Bulbuls being most in evidence, and their plumage is very soberly coloured. The butterflies, however, are both numerous and brilliant and strike even an indifferent observer. Throughout the year, in places where a little vegetation manages to exist, great numbers of lovely butterflies are to be seen, especially the dark but resplendent *Euplœinae*, characteristic of the East, whilst many species of *Papilio* and other gorgeous and striking genera fly hither and thither at a speed which quite eclipses their English relatives.

Wallace, in his "Geographical Distribution of Animals" includes S. China in the "Oriental Region" as the "Indo-Chinese Sub-region," and his arrangement is here followed when reference is made to the range of families and genera.

Hongkong is some seventy miles within the tropic of Cancer, the line passing a few miles north of Swatow and nearly equally dividing Formosa, in the opposite direction almost touching Wuchow. The island itself is about eight miles by four, with an area of some twenty-nine square miles, nearly all hills, separated from Kowloon on the mainland by a strait about half-a-mile broad at its narrowest points. Though there are few large trees, and small firs outnumber other species, yet it is well wooded and looked after by an Afforestation Dept., whilst the natives are not allowed

to destroy the trees with impunity. The island is not, therefore, a fair sample of the vegetation of S. China, such as the mainland opposite presents. Macao is about forty miles west and slightly south of Hongkong, on the opposite side of the West River estuary, occupying a tiny peninsula of the district of Heungshan, one of a series of islands lying in the estuary and only separated from each other and the mainland by very narrow channels. The country near both places is very hilly but few summits attain three thousand feet, and the hills lie in confused masses rather than distinct ranges. The geological formation is igneous and for the most part a grey granite.

The summer is hot and moist; the winter or dry season usually hot during the day, but with short spells, generally in January and February, of really cold weather, sunless and often with dense fog or drizzling mist. The wet and dry seasons are well differentiated and many butterflies have their very distinct seasonal forms, whilst the majority vary slightly at each period. Through the courtesy of Mr. Figg of the Kowloon Observatory I am able to give the following climatic notes for the twenty years 1884-1903 inclusive. Taking October to March inclusive as the dry season, for the rainfall seems to diminish rapidly in October and rise correspondingly in April, the mean six months rainfall is 13.28 inches; the mean six months wet season 71.54 inches. The mean annual rainfall is therefore 84.82 inches. The lowest temperature occurring during these twenty years was 32° F. in January 1893; the highest 97° in August 1900. The two coolest months are January and February with a mean temp. of 58.7 F. The weather during these months is extremely variable; during February 1905 the therm. on the tenth fell to 42.8° and a few days later rose to 73.5°. Violent rain accompanies the typhoons which frequently occur, generally during July, August or September, but it does not appear to destroy much insect life, butterflies being as numerous as usual a day or two after one of these storms. A long-continued spell of cold weather, however, will make butterflies very scarce for weeks after. But probably the chief reason why some butterflies are very sporadic in their appearance here, abundant some years and then missing for several years, is the continual destruction of the foodplants of larvæ by the native fuel-gatherers, whilst the flocks of goats seem to be increasing, animals most destructive to plants and young trees; and the great numbers of pigs which roam through the woods must nearly exterminate some plants.

Some excellent reasons why butterflies are such an interesting study and especially valuable in solving many problems in nature, may be found in the address to the Ent. Soc. of London for 1903, Part V, entitled "What is a Species?" and a few passages are here quoted. Insects are valuable as a study because of "the large number of offspring produced by each pair of insects, and the rapidity with which the generations succeed each other, many cycles being completed in a single year in warm countries; in the severity of the struggle for life which prevents this remarkable rate of multiplication from becoming the cause of any progressive increase in the number of individuals; and finally, in the character of the struggle itself, which is precisely of that highly specialized kind between the keen senses and activities of enemies, and the means of concealment or other modes of defence of their insect prey, which leads, by action and reaction, to a progressive raising of the standard in both pursuer and pursued." And further on "they (butterflies) stand at the head, not

only of all insects, but of the whole organic world, as registers of subtle and elusive change, by means of which forms are slowly becoming different from what they have been in the past."

Butterflies, too, are a very ancient Order of insects, fossil butterflies recognized as referable to existing genera, having been found in early Tertiary formations, showing that even then these insects were highly specialised.

Many apparently imported butterflies have occurred in Hongkong in recent years; it may be that, owing to the vast increase of shipping and rapid transit between remote countries, beginning about the middle of the last century and always extending, the facilities for distribution of species will be increased largely. Some insects, not finding suitable foodplants or climatic conditions, will remain accidental visitors only; others will no doubt become naturalized and flourish here. The botanic gardens now established in many places may perhaps account for the presence of some unexpected species, which find there sufficient food for a limited number of individuals, perhaps for many years, or until the larvæ have begun to feed on some indigenous plant.

I have to thank Messrs. Dunn and Tutchet of the Botanic Gardens at Hongkong, for naming all the foodplants of larvæ and correcting the botanical references taken from Bentham's "*Flora Hongkongensis*," some of which required revision, as that valuable work was published over thirty years ago. Commander Walker's "*Preliminary List of Butterflies of Hongkong*" in the Trans. Ent. Soc. of Lond. for 1895 has been of great assistance. Dr. Gomes da Silva of Macao kindly lent several specimens for figuring, and Mr. Heron of the Brit. Mus. identified several species.

I am specially indebted to Professor Poulton, F.R.S., who identified most of the butterflies; and his notes and suggestions from a correspondence for which, though hard pressed, he was good enough to spare the time, are included in the following pages. Through Professor Poulton I am indebted to Dr. Dixey for the arrangement of the *Pieridæ* and to Mr. Druce for that of the *Lycænide* and *Hesperidæ*.

As the number of species described is the result of some seven years collecting, the species new to this list which are sure to be added by degrees will probably scarcely affect the generic features, here presented, of the butterfly fauna found on a wide strip of coast extending from Hainan to the Chusan Islands. It may perhaps be thought that too much space is devoted to the very common insects, but these are really more important than the butterflies which are rarely seen, partly because they add infinite life and charm to the country, and partly because they are generally of more value in elucidating many most interesting questions concerning the past history of the earth.

J. C. K.

Macao, October, 1905.

I. FAM. NYMPHALIDÆ.

SUB. FAM. DANAINÆ (LIMNIINÆ).

1. GENUS *DANAIS* (CADUGA, TIRUMALA, PARANTICA, RADENA, SALATURA, ANOSIA, LIMNAS).

2. GENUS *EUPLCÆA* (ISAMIA, TERPSICHOIS, CRASTIA, PADEMMA).

The *Danainæ* are a wide-ranging group, essentially tropical, but represented in all the warmer parts of the world. They have been split up into numerous sub-genera, but as only a few species are here dealt with, it is convenient to include them all in *Danais*; the sub-genera are, however, given in brackets. The males usually have a peculiar finely-haired anal scent-gland, as well as scent-sacs on the hindwings.

Danais (Caduga) *sita*, Kollar.

Perhaps more generally known as *tytia*, Gray, but *sita* is the older name. An uncommon sp. here, and seems to occur chiefly in the early part of the year, preferring wooded localities and gardens, where it sails up and down with a rather strong flight, often high up about the tops of trees. Like most of the *Danainæ* it is fond of certain flowers, chiefly flowering shrubs and trees. Fig. 1, Pl. 1 is from a ♂ taken in March. The ♀ is similar, but without the scent-sac at the anal angle of the hindwing.

According to de Nicéville and Mackinnon (The Butterflies of Mussoorie) the eggs are white, longitudinally ribbed, about three times as long as broad, laid singly on young leaves of *Marsdenia Roylei*, Wight, Nat. Ord. *Asclepiadææ*, the foodplant of the larva. In the full-grown larva the ground colour is of a pale yellowish green, with two rows of dorsal and a row each side of lateral yellow spots; head black with grey spots on the face; legs black; two tentacles or processes on the third segment and two on the twelfth seg. Pupa, pale emerald green, with golden-yellow spots.

Two sp. of *Marsdenia* occur in Hongkong, but apparently not the one above referred to.

I cannot discover if the Chinese use larvæ of butterflies in medicine, but when out with the net, if the villagers do not consider one simply mad, they sometimes ask if the butterflies are to be used for medicine. The nastier a dose tastes the more efficacious a native seems to think it, and larvæ feeding on very rank plants no doubt extract some of their virtues and should have a more powerful effect than the decoction of moulted skins of *Cicadææ* or Scissorgrinders, which is used by Chinese doctors to dose their patients in certain disorders.

Danais (Caduga) melaneus, *Cramer*.

A very scarce insect here, and not very liable to be mistaken for *D. sita* even on the wing, since the almost black hindwings show plainly, whereas those of *D. sita* appear very distinctly red, especially in flight; otherwise the two sp. are almost identical in marking, and are alike in habits.

Fig. 2, Pl. 1 is from a ♀ taken in March. The ♂ is similar, but has a scent-sac at the anal angle of the hindwing.

Danais (Tirumala) limniacæ, *Cram*.

Fairly common, and has rather a strong flight, but easily mistaken on the wing for *D. similis*, though the latter has a decided reddish tinge on the underside of the hindwings. It prefers woodland, is fond of flowers, and may be found almost throughout the year, though most abundant in autumn. Like very many of the butterflies here it is much attached to the flowers of *Lantana Camara*, L, a naturalised S. American shrub bearing closely-packed pink and orange blossoms, flowering throughout the year. It seems to spread rapidly and is now found over most of Kwangtung.

Fig. 3, Pl. 1 is from a ♀ taken in May; the hindwing (underside) figured separately on the same plate is that of a ♂, showing the scent-sac, in this and the following sp. largely developed. Otherwise ♂ and ♀ are alike.

The larva, according to Forsayth (Life-History of Lepidoptera observed in Central India) is of a pale yellowish green, ribbed with black transverse lines; black markings on the head. Two tentacles on the third seg. and two on the twelfth seg. It feeds on a creeper, probably a *Cocculus*.

Pupa, green with patches of gold.

Danais (Tirumala) septentrionis, *Butler*.

Also fairly common and apt to be confused with *D. Limniacæ*, though *septentrionis* is usually larger and the bluish markings much deeper in tint. The spots and markings on *septentrionis* are smaller and narrower, giving a larger expanse of black, but they are identical in number and approximately in the same position as in *D. limniacæ*. Both sp. vary in the shape of the spots and markings. This butterfly seems to occur chiefly from May to December, and has the same habits as the foregoing sp.

Fig. 4, Pl. 1 is from a ♀ taken in June. The underside is like *D. limniacæ*. The sexes are alike, except that the ♂ has a scent-sac on the hindwing similar to *D. limniacæ*.

Danais (Parantica) melanoides, *Moore*.

Apparently very scarce, in fact I have only recently taken this sp. at Macao, and had to figure it on a subsequent plate. It seems rather weak on the wing, and might readily be mistaken for *D. similis*, but the bluish spots and markings are much paler, almost white. When in fresh

condition it has a patch of lemon yellow on each side of the abdomen. This sp. must have been much more frequent when Commander Walker was in Hongkong in 1892-3. He took it from January to April, and says it flies close to the ground along shady paths.

Fig. 2, Pl. VIII is from a ♀ taken in August, at *Lantana* flowers.

Danais (Radenia) similis, *Linnæus*.

The commonest sp. of *Danais* here, flying throughout the year, and found almost everywhere, though it is fond of trees and shade and very partial to flowers. The sexes are alike, and the ♂ has no scent-sac on the hindwing, though it is provided with the usual anal scent-gland.

Fig. 5, Pl. I is from a ♂ taken in December, but this insect scarcely varies seasonally.

The egg is yellowish white, striated longitudinally, about twice as long as broad, laid singly on stems, tendrils or leaves of the foodplant, *Tylophora hispida*, D.C., a twiner, Nat. Ord. *Asclepiadææ*, only known at present from Formosa and Hongkong.

The larva is figured on Pl. 1a, Fig. 7, the pupa Fig. 8. In the latter figure the bluish colour on the band and spots represents silver. Larva just hatched whitish, showing tentacles as black dots. Head black. The larvæ always seem to rest on the underside of the leaves.

Danais (Salatura) plexippus, *Linn.*

More often known, perhaps, as *genutia*, *Cram.*, but *plexippus* is the older name. A very common butterfly, especially in autumn, but found everywhere throughout the year, and very fond of flowers. It is a beautiful and conspicuous sp. and common enough to brighten up many a forlorn and sordid spot round the filthy native villages. This insect, with *D. similis*, the two common sp. of *Euplœa* and a few *D. limniacæ* swarm on the twigs and leaves of bushes and trees in sheltered nooks during November, where they cling all day if the weather is dull, rising in a dense cloud if disturbed, but soon settling again. I have never noticed any *D. chrysippus* amongst them. These gatherings are dispersed before the end of December, when many butterflies will be found dead beneath the bushes.

Fig. 8, Pl. I is from a ♂ taken in November. The ♀ is like the ♂ but is without the scent-sac on the hindwing.

Egg, about twice as long as broad, striated slightly longitudinally, laid singly on the underside of leaves of the foodplant, *Asclepias curassavica*. The larva and pupa will be described later, as I have only recently obtained the eggs of this butterfly, but the larva just hatched is white, with three pairs of tentacles, as in *D. chrysippus*, just showing as brown dots. Head black.

Danais (Anosia) archippus, *Fabricius*.

Merely an accidental visitor at present, occurring at long intervals, but it is one of those butterflies which seem to be gradually spreading over the globe. Its original habitat is N. America, but it appears to be very closely allied to the S. American *D. erippus menippe*, Hübner.

Fig. 7, Pl. 1 is from a ♂ taken in August. The ♀ is similar, but the neuration of the wings is broadly bordered with black, and the scent-sac is wanting in the hindwing.

The larva, according to Scudders *Butterflies of New England*, seems to resemble that of *D. chrysippus*, and its foodplant is the same.

Danaïs (Limnas) chrysippus, Linn.

Very common and on the wing throughout the year. It has rather a weak flight, generally keeping not far from the ground, and is very fond of flowers. An exceptionally interesting butterfly because it is mimicked to perfection by the ♀ of *Hypolimnas misippus* and also, in South Africa, by sp. of *Acraëna*. This *Danaïs* is a very widely distributed insect. It varies very much in size in both sexes, in the wet as well as the dry season. The ♀ is like the ♂ but has no scent-sac on the hindwing.

Fig. 6, Pl. 1 is from a ♂ taken in March.

The egg is nearly white, about twice as long as broad, slightly striated longitudinally. It is laid singly on either side of the leaves or on the flower-stems of the foodplant, *Asclepias curassavica*, L., a plant native to Trop. America, now naturalised here and over most of Kwangtung.

The larva is figured on Pl. 1a, Fig. 5, pupa Fig. 6. The spots on the pupa are gilt, represented in the figure by yellow. The larvæ rest indifferently on either side of the leaves. Occasionally a larva is extremely pale in colouring, the black transverse bars being replaced by very pale brown or ochreous; or sometimes a specimen will be of a uniform dull green, though retaining the yellow markings, but the resulting imago is the usual form. The larvæ are most voracious, and rapidly attain their full growth.

It may be here noted that the sp. of *Danaïs* in this district seem to exhibit little, if any, seasonal change of form or colour.

The natives generally misunderstand the purpose of the net, and one constantly hears "Tseuk-tsai," "tseuk-tsai"—small birds—he's catching small birds. *Wü tip* or *Oo tip* is the word commonly used for "butterfly" by the country people, though Mr. Dyer Ball informs me that 蝴蝶, *Wü tsit*, is the most correct form, whilst 蝴蝶, *Wü tip* is that most generally in use. Yet another term is *Päng shá*, for which there are no characters. Moths are differentiated as *Tang ngo*, 燈蛾



EUPLEA MIDAMUS, VAR.

EUPLOEA is a genus wholly Oriental and Australian, but most abundant in the former Region. It has been divided into several Sub-genera which are given in brackets. The males usually have an anal scent-gland, as in *Danaïs*, and a "brand" or male-mark in the forewing, between the submedian nervure and median nervule.

Euploea (Isamia) midamus, Linn.

One of the commonest and most conspicuous butterflies here, though it generally appears almost black when flying, the splendid deep blue or violet only showing in certain positions; it has a rather indolent floating or sailing flight, but can fly very smartly on occasion, as when toying with a mate. Exceedingly fond of flowers, especially *Lantana*, it also likes shade, though it will remain for hours under a blazing sun at its favourite blossoms, or flying slowly up and down exerting and withdrawing its bright yellow scent-gland. It is on the wing throughout the year, in some localities gathering in swarms in the autumn, in company with *E. amymone*.

Fig. 1, Pl. II is from a ♂ taken in December. The ♀ is similar, but with less blue gloss and inclining still more to purple, whilst the brand in the forewing is wanting. The inner margin of the forewing is also shallow in the ♀, very deep in the ♂. Both sexes vary in the distinctness of the white marginal spots in the hindwing; the form with the spots practically obsolete being a Chinese variety which has been known as *Isamia sinica*. Sometimes the apical pale lilac spots in the forewing are largely developed, as may be seen by the figure facing page 11, *Euploea midamus*, var., from a photograph of a ♂ taken at Macao, kindly sent by Professor Poulton. Occasionally the forewings have a glazed smear, as if a snail had crawled over them, but under a glass it appears to be due to scattered minute pale blue and whitish scales. *E. amymone* is also subject to this appearance. *E. midamus* has little, if any, seasonal change, but dwarf forms are not uncommon.

Egg, yellowish-white, about twice as long as broad, striated slightly longitudinally, laid singly and usually on young shoots or the underside of leaves of the foodplant, *Strophanthus divergens*, Grah., Nat. Ord. *Apocynaceæ*, a sprawling shrub, not known out of S. China.

Larva, figured on Pl. 1a, Fig. 3.—Sometimes the larvæ appear greenish in places, owing to the semi-transparent skin. They generally rest on the underside of the leaves.

Pupa, the usual dumpy *Euploea* form, at first a bright waxy yellow, afterwards brilliantly gilded almost entirely, but with a few pale brown markings, and the spiracles marked in black. Attached by the tip of the abdomen only.

The *Euploea* seem liable to folding or creasing of the wings, due to not properly expanding immediately on leaving the pupa.

Euploea (Terpsichrois) mulciber, Cram.

Form *linnaei*, Moore. Decidedly uncommon here, and the females seem more numerous than the males, contrary to the general rule, for I have taken about a dozen females for one male.

The ♀ is certainly conspicuous from the white bordering the neuration of the hindwings, but the ♂ is also striking even when flying, as it often does, with the two common *Euplœinæ* here, from its very brilliant blue patch and differently shaped wings. It appears to keep more strictly to shady and wooded localities than the two common sp., but like them it is very fond of the exudations of *Heliotropium indicum*, Linn., when in seed, even when the plant has been cut and lies withered on the ground. This is a common weed throughout the tropics.

Fig 4, Pl. II is from a ♀ taken in June, Fig. 5 from a ♂ of the same month.

Larva, figured on Pl. 1a, Fig. 4.

Pupa, in shape very like that of *E. amymone*, at first of a shiny pale reddish-yellow, with broad pale purple-brown markings on the back. Later, silver-gilt with pale brownish markings. Attached by the tip of abdomen only.

The larva feeds on *Toxocarpus wightianus*, H. & A., a twiner not known out of China Nat. Ord. *Asclepiadeæ*.

Euplœa (*Crastia*) *amymone*, *Godart*.

This insect has been known under various synonyms—*E. core*, Cram., *E. frauenfeldii* var. *lorquintii*, Felder, *C. kinbergi*, Aurivillius, and the extreme var. with the apical pale lilac patch in the forewing as *E. godarti*, Lucas. They appear, however, to be all referable to *amymone*, in spite of the great individual variation. The var. *godarti* I have bred from eggs laid by the usual form of *amymone*, and if a sufficient number is available it is easy to arrange a series graduating from typical *amymone* to *godarti*, the inner row of apical white or lilac spots, which tend to disappear in some specimens, developing in others till they assume the form *godarti*.

The *Euplœinæ* seem to be a specially protected, very prolific group, well adapted to take advantage of every opening to increase the race and extend their range; and this would tend to produce varieties. Some of the extreme varieties will no doubt—through the failure of intermediate forms not so well fitted to cope with the dangers incident to butterfly life, or dying out from many other and perhaps more quickly-acting causes—become in the future very distinct species.

As in *E. midamus*, the marginal white spots in the hindwing are very variable in both sexes, sometimes large and showy, in others almost or quite obsolete. Of a batch of twenty bred from the eggs of one ♀—the resulting imagines happening to belong equally to either sex—about half of each sex had very distinct white spots, whilst the rest hardly showed traces. This butterfly is even more common than *E. midamus*, but it has the same habits and is found in company with it, and is on the wing throughout the year. The anal scent-glands, common to *Danaïs* and *Euplœa* in the ♂, are just above the armature and during coition are withdrawn into the abdomen. They consist of two rather long, pliable, hollow processes, connected at the base, capable of being extruded or withdrawn at pleasure by the insect. In their normal position within the abdomen they are lined inside with delicate hairs, which appear on the outside as the gland is put forth and unrolls; on the withdrawal of the gland the tip rolls inwards and the hairs disappear, as the finger of a glove

is turned inside out or the reverse. In *E. midamus* and *E. amymone* the hairs are bright yellow, in some of the *Danainæ* light brown. The gland of the present sp. is figured on Pl. 5a, Fig. 5, about twice the natural size. These appendages and the sacs on the wings seem to be used as attractions for the ♀.

The great vitality of *Euplœa*, and in less degree of *Danaïs*, is often demonstrated by their flying away after being severely pinched in the thorax and enclosed all day in a paper; and I have found the large black-and-yellow spider, so common here (*Epeira maculata* of Donovan's Insects of China) busily engaged in eating *E. amymone*, investigation showing that most of the underside of the abdomen and some of the thorax had been disposed of; yet even in this condition the butterfly on being released made off with a strong flight to the top of a large tree. But sometimes, the moment it is entangled, the spider seizes the butterfly with its front legs, steadying itself on the two middle pairs, and with the hinder pair working alternately draws a continuous stream of thick, sticky, yellow silk from its spinnerets, with which it wraps up the unfortunate butterfly, crumpling it into a ball. This spider and the large green mantis, also very common here, seem to be almost the only enemies of these butterflies in the perfect state. The mantis is fond of lurking beneath the dense flowers of many shrubs and trees which attract hosts of insects. It generally bites off the wings of a butterfly, letting them fall to the ground, but sometimes eats legs, wings and all.

The ♂ of *E. amymone* has a brand in the forewing.

Fig. 2, Pl. II is from a ♀ taken in December, Fig. 3 a ♂ of the same month, and Fig. 6 a ♂ var. *godarti*, taken in November. This extreme form is not common.

Egg, like that of *E. midamus*, and laid singly on the foodplants of the larva, *Toxocarpus wightianus*; *Ficus variolosa*, Lindl., a banyan native to S. China and Malaya, Nat. Ord. *Urticæ*; on the introduced shrub Oleander, and occasionally on a sp. of *Allamanda*, and on *Asclepias curassavica*, the two former plants Nat. Ord. *Apocynaceæ*. The egg is laid usually on the underside, sometimes upperside of the leaves, or on bracts or shoots. The larvæ generally rest on the underside of the leaves.

Larva, figured on Pl. 1a, Fig. 1, pupa Fig. 2. Just hatched, the larva is of a plain shiny yellow, the tentacles just showing as black points. The pupa is at first of a bright waxy yellow, afterwards brilliantly silvered, indicated in the figure by blue.

Euplœa (Pademna) crassa, Butler.

Either an accidental visitor or very scarce, but easily confused on the wing with the former sp., though the wings of *crassa* are broader and the outer margins fuller, whilst neither sex has any blue flush. It is a common Burmese and Siamese sp.

Fig. 8, Pl. XIII is from a ♂ taken at Penang in May, kindly sent by Professor Poulton, as I had unfortunately sent home my specimens without figuring them. They were taken at Macao in November, flying in company with the two common sp. of *Euplœa*. The sexes are similar, but the ♂ has a broad, short brand in the forewing, and the inner margin thereof is very deep.

Euploea (Salpinx) kadu, *Eschscholtz.*

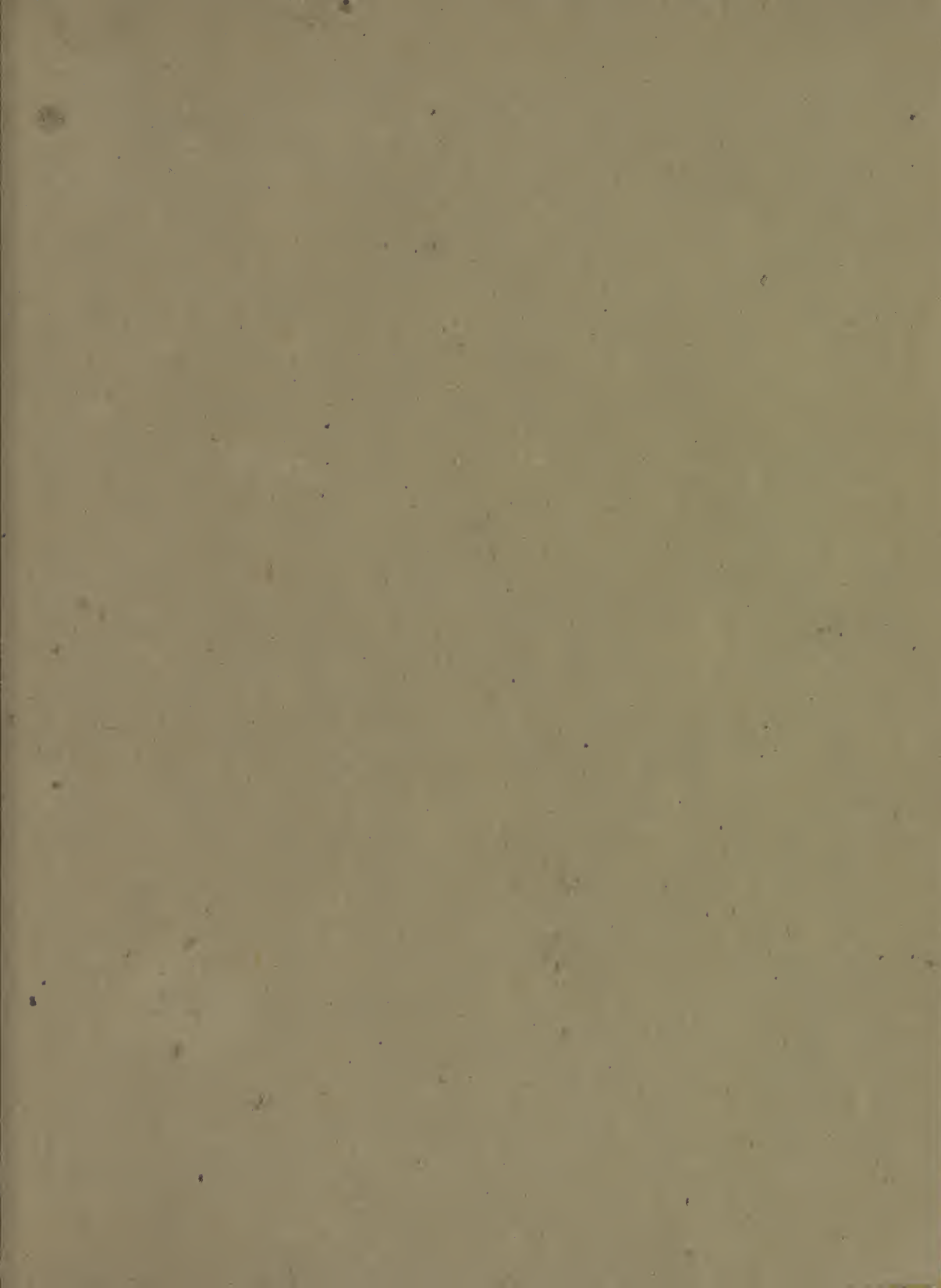
Commander Walker informs me that since his list was written he has seen this sp., taken at Hongkong, but it must be very rare here.

The *Danainæ* rest with either closed or open wings, often slowly fanning with them whilst probing a flower. The long processes or tentacles on *Danaid* larvæ are very pliable, and seem often to be used as antennæ, especially the front pair. *Danaid* pupæ are attached by the tip of the abdomen only, without a band round the middle. The eggs of the *Danainæ* and the great majority of butterflies are laid singly, though several may be deposited on different parts of the same plant. All butterfly larvæ I have reared attached themselves, when very young, by a thread of silk to their foodplant. Afterwards they spin a few threads on the surface they traverse to form footholds, moving their heads from side to side as they lay down the filament, and sometimes having a curious alternating movement lengthwise, especially in the larvæ of the *Papilioninæ*. Many larvæ select a resting-place, preparing a path of threads to it, and retire there after feeding, often on remote parts of the plant. Some larvæ after hatching eat their egg-shells; many after moulting eat their cast-off skins. They often travel a long distance from the plant on which they have been feeding, before deciding on a position to pupate in.

In the wet season eggs hatch in rather less than four days; larvæ feed for about three weeks; pupation takes one or two days; the imago usually emerges in seven to ten days. Each stage is of longer duration in the dry season; larvæ sometimes feeding for two months or more, and the pupal state lasting a month or over. The imagines of many larvæ pupating in December, do not emerge till April.

An excellent way to rear larvæ from the eggs is to keep these in wide-mouthed bottles, as a piece of the foodplant corked up will keep fresh for a long time; the eggs and young larvæ will also be secure from the attacks of ants, which are always prowling after them, though they do not often meddle with fair-sized larvæ, unless they have been injured in some way. But as ants carry off pupæ, breeding-cages should always be isolated by water.





Part II.

BUTTERFLIES
OF
HONGKONG
AND
SOUTH-EAST CHINA.

J. C. KERSHAW, F.E.S., F.Z.S.

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HENTSCHEL, COLOURTYPE.

PLATE II.

1. EUPLŒA MIDAMUS, *Linn.*
2. EUPLŒA AMYMONE, *Godart.*
3. EUPLŒA AMYMONE, *Godart.*
4. EUPLŒA MULCIBER, *Cram.*
5. EUPLŒA MULCIBER, *Cram.*
6. EUPLŒA AMYMONE, *Godart.*
7. LETHE EUROPA, *Fabr.*
8. LETHE EUROPA, *Fabr.*
9. MYCALESIS MINEUS, *Linn.*
10. MYCALESIS MINEUS, *Linn.*







HENTSCHEL, COLOURTYPE.

PLATE III.

1. LETHE CONFUSA, *Auriv.*
2. MELANITIS LEDA, *Linn.*
3. MELANITIS LEDA, *Linn.*
4. YPHTHIMA AVANTA, *Moore.*
5. YPHTHIMA AVANTA, *Moore.*
6. CUPHA ERYMANTHIS, *Drury.*
7. DISCOPHORA TULLIA, *Cram.*
8. DISCOPHORA TULLIA, *Cram.*
9. CLEROME EUMEUS, *Drury.*
10. SYMBRENTHIA LUCINA, *Cram.*
11. ERGOLIS ARIADNE, *Linn.*
12. CIRROCHROA MITHILA. *Moore.*

111 111 111

GENERAL NOTES.

Hongkong, as has been observed already, is near the borderland of the Palæarctic Region, but the butterfly fauna is almost wholly tropical in character, and the two butterflies *Olerome eumeus* and *Gerydus chinensis*, peculiar to this part of China, belong to tropical genera. The only European species found here are *Danaïa chrysippus*, which occurs in S. Europe, *Vanessa cardui* (Painted Lady) and *Polyommatus bœticus*, all three insects of almost world-wide range. *Danaïa* is a tropical genus, some species of which are constantly extending their bounds, and *D. chrysippus* may perhaps be of comparatively recent occurrence in Europe. *Charaxes* is essentially a tropical genus, but has one species in S. Europe. The only characteristically Palæarctic genus except *Vanessa* is *Argynnis*, represented here by an insect which has a wide range in the Eastern tropics.

Butterflies seem to be more dependent on special vegetation, and therefore climate, than birds or mammals, and with these latter migration often takes place to a great extent; so that in a district on the confines of two Regions not separated by any formidable barrier, butterflies may perhaps be expected to show the affinity of the district better than other fauna. They no doubt migrate locally in some degree, and dominant groups are continually though slowly extending their range, as witness *Danaïa archippus*, Fabr., which Commander Walker—observing in 1893 that its foodplant, *Asclepias curassavica*, had spread throughout the Moluccas and Philippines and to Hongkong—notes that he did not find further from its original home than Ternate in the Moluccas. Since then it has occurred (1901) in Hongkong, but apparently only once, when a ♂ and ♀ were taken the same day, evidently not long emerged from the pupa. *D. chrysippus* is now so abundant here that scarcely a plant of *Asclepias* is free from its larvæ throughout the year, and this may be the reason *D. archippus* has not yet gained a footing, as the plant though widely scattered over this district is not very numerous in any one spot. But no movements, I believe, take place amongst butterflies comparable to those of birds. As regards the latter they are represented here by several Palæarctic as well as tropical genera, especially in the winter when (besides the ubiquitous Magpies and a Titmouse very closely allied to the English *Parus major*, which are resident and among the commonest birds) hosts of Pipits, Wagtails, Stonechats and other birds arrive and give quite a homelike character to the birdlife; the grey Wagtail being identical with the English bird, whilst the Pipits and Stonechat are merely Eastern forms of the English species, so close as to be hardly distinguishable. The butterflies, however, agree as might be expected with the vegetation—which must influence them even more than climate, since the larvæ of many are restricted to one or two foodplants—and this is decidedly tropical, in spite of the everpresent fir-tree and the general absence of indigenous palms, except two or three species, which are, however, very common. The vegetation at Shanghai on the other hand is almost wholly Palæarctic, and two butterflies very common there are either identical with or very close to the English “Clouded Yellow” and “Brimstone,” belonging to *Colias* and *Gonepteryx*, typically Palæarctic genera.

Specimens of *Ideopsis daos*, Boisduval, are in the Brit. Mus. with locality "Hongkong," but either this is a mistake or they are importations, like the specimen of *Hestia lynceus*, Drury, which Commander Walker saw, taken on the wharf at Kowloon many years ago, and which he observes was obviously imported. *Ideopsis* and *Hestia* are genera which love deep, continuous forest, which does not exist here. Many butterflies, now characteristically Malayan and forest-dwellers were probably formerly common in S. China, before the hills were denuded of their forests by the Chinese, so that the heavy rains run off the hills like water from the roof of a house, scoring their flanks with deep and narrow crevices or small ravines, which are dry soon after the rain ceases. The Chinese have an excellent object-lesson before them in the re-afforestation of Hongkong and the New Territory, the latter now rapidly proceeding, but it is highly improbable they will profit by it. The daily round of hordes of dirty, unkempt children and numbers of goat-footed women is to set forth with choppers and bamboo rakes and collect everything available for fuel, twisting off a bough here and another there, sweeping up leaves and straws and even combing the grass, much of which is torn up by the roots. These goat-footed women do much of the field-work here, though debarred from rice-planting and catching fish on the tidal mud-flats, where they would sink helplessly; but they may be seen cutting herbage right up on the hills.

I am told that boxes of butterflies, arranged in wonderful figures and patterns, used at one time to be sold in Hongkong, but fortunately the utilitarian natives have not yet turned butterflies to account as the aborigines of Australia have, where a certain species of *Euploea*, which sometimes occurs in hosts, is used as food. But many other insects are utilized besides the silk-producers and other well-known creatures; live grasshoppers and baked beetles and larvæ, sold for feeding cagebirds; the crickets used for fighting, as gamecocks are in the Philippines and other countries; the large cicadæ, captured in the wet season by men and children armed with a long bamboo smeared at the tip with birdlime. These "scissorgrinders" as Europeans here call them are kept in little bamboo cages, apparently for the pleasure of hearing them shrilling. But even the children take no heed of butterflies.

Although the villages are generally surpassingly filthy, the immediate neighbourhood is little better, and a large geotrupid beetle does its best to cleanse the highways and byeways and also fertilise the soil, by burying excremental matter, but though one of the commonest beetles here, it is not numerous enough, even when assisted in its sanitary labours by the swine. Some butterflies occasionally exhibit a very depraved taste as regards their food, especially *Charaxes*, and they never lack means to gratify their desires in this part of China.

Wallace says the boundary of the Oriental and Palearctic Regions on the coast of China appears to be somewhere in the neighbourhood of Foochow—or about midway between Hongkong and Shanghai—and inland following the Nan-ling mountains, which divide the watersheds of the Yangtse and Si-kiang or West river, and separate Kiangsi and Hunan from Kwangtung. This range does not average more than three thousand feet in height and would perhaps hardly constitute a real barrier to the intermingling of the Palearctic and Oriental faunas, but it forms an approximate boundary of the tropical or sub-tropical part of the Oriental Region in S. China; the Yangtse probably being a more natural boundary of the two Regions, though of course a hard-and-fast line cannot be drawn here, as is usually the case except where the barrier is a wide stretch of sea or desert or a high mountain range.

Mr. Dunn, who recently made an extended botanical expedition to Fukien, the province which abuts on Kwangtung to the north, informs me that the flora is an almost equal intermingling of tropical and temperate forms.

The butterflies familiar to everyone here, which make a show all the year round, are *Danaïs*, *Euplœa*, *Precis*, *Neptis*, *Catopsilia* and *Terias*, the prevalence of the four latter genera indicating the open character of the country; whilst, excluding January, February and December, the *Papilioninæ* are exceedingly numerous and probably more noticed than other genera on account of their large size and usually brilliant colouring. The months when butterflies are, on the whole, best represented here are March and April, October and November; June, July and August being probably the least productive months, having together with May the greatest rainfall; as this is also the hottest period of the year it would seem that great heat and excessive rainfall do not alone account for the hosts of butterflies in tropical regions, but rather a moderately high temperature and uniformity of moisture throughout the year, when brood succeeds brood without any prolongation of the larval stage due to lack of moisture, or perhaps in a comparatively treeless country to too great heat—or rather want of sheltering trees and shade to temper the heat. The first of the wet season forms to appear have of course matured from eggs laid by dry season forms, the reverse obtaining in the dry season. The actual causes of seasonal change are not yet well understood and authorities differ as to the amount of effect produced on the one hand by heat and cold, on the other by a dry and a wet atmosphere. During the winter here the air is exceptionally dry as a rule, and the resulting harsh and shrivelled foliage of much of the vegetation is no doubt the chief cause of the slow feeding and extension of the larval period in the dry season; the larvæ become generally larger than the wet season forms, the resulting butterflies naturally tending to be larger than their wet forms; but this phenomenon is not invariable.

October is the time of change to d.s.f., when the N.E. monsoon sets in; April the change to w.s.f., when the S.W. monsoon begins. Overlapping, however, takes place to a certain amount in most butterflies, to a great extent in the *Satyrinæ*.

The eggs of butterflies are beautiful objects under a glass, of elegant and varied shape, fluted, beaded and ornamented in endless patterns, though the eggs of allied species exhibit a similarity of outline. Though so delicate and fragile-looking the shell, which rapidly hardens after deposition, is remarkably tough and elastic; globular eggs if dropped on a hard surface will rebound like a tennis-ball. If possible, a few typical eggs will be subsequently figured, drawn on a large scale.

SUB-FAM. SATYRINÆ.

1. GENUS LETHE (DEBIS).
2. GENUS MYCALESIS (CALYSISME).
3. GENUS MELANITIS.
4. GENUS YPHTHIMA.

The Sub-fam. has a universal distribution, but the above genera are restricted to the Oriental, Australian and Ethiopian Regions, and they are chiefly Oriental. *Lethe* and *Melanitis* are mainly crepuscular, *Mycalesis* much less so, whilst *Ypthima* is diurnal altogether in its habits. A conspicuous Satyrid feature is the subcostal nervure, which is much swollen or dilated at the base. The larvæ of these genera are very sluggish, eating slowly and remaining motionless for long periods till just before pupation, when like all larvæ they become restless. The foodplants of all the genera here represented are various grasses or reeds.

Lethe europa, Fabr.

Very common, but keeping to jungle and thickets, where towards evening it flits in and out with a swift and most erratic flight, the ♀ being fairly conspicuous from her broad white bands in the forewings. It is especially attached to bamboo clumps, and fond of threading its way through the mazes of scrub and jungle, sometimes settling very suddenly with closed wings, often on the underside of a leaf, occasionally on the ground; sometimes two or three toy together over the bamboo tops. It is not fond of flowers, but sips the exuding juices of trees, particularly the sap of bamboo shoots, where it may frequently be seen during the day, in company with *Hemiptera* and beetles, all very intent on sucking up the gum or sap. It is also fond of overripe *Lantana* berries and other fruits. The ♀ when engaged in laying may be seen flying at any hour of the day, whilst the ♂ usually avoids broad daylight. The ground colour on the upperside of both sexes is sometimes very light compared to its usual tint, becoming ochreous.

Fig. 7, Pl. II is from a ♀ taken in October, Fig. 8 from a ♂ taken in July. This butterfly varies little, if at all, seasonally; the pale forms being found irrespective of the time of year, for it is on the wing every month, though most numerous in autumn.

Egg, globular, smooth, pale green; laid singly on the underside of a bamboo leaf, the foodplant of the larva. It does not feed, so far as I can find, on the tall bamboo used for scaffolding and carrying-poles; nor on the sp. with the very large, broad leaves, but on the bushy, much-branched and often thorny varieties.

Larva, figured on Pl. 1a, Fig. 11, pupa Fig. 12. Just hatched the larva is entirely white, head included. The two parts of the cleft posterior of this larva are usually kept close together, so that they appear like one stout horn. This is also the case with other Satyrid larvæ.

The parts coloured yellow in the figure of the pupa are gilt.

Lethe confusa, *Auriv.*

Very scarce here, but seems to have the same habits as the former sp. I have only obtained this insect at Hongkong.

Fig. 1, Pl. III is from a ♂ taken in July, at bamboo exudation.

Lethe verma, *Koll.*

Also apparently rare, as Commander Walker took but one specimen in March, at the exuding sap of a tree, and saw one or two others in local collections. I have not seen it here.

Mycalesis (Calysisme) mineus, *Linn.*

A very abundant insect, on the wing throughout the year, and though much more diurnal in habits than *Lethe*, delighting in shade and dark retreats under bushes and trees, where the same individuals may be found for days together. Though it does not fly far nor very swiftly, it has a jerky, lively flight and is constantly in movement, flitting about in the underwood and returning to the same resting-place again and again, often toying with others of the same species. It is fond of settling on the ground, especially amongst dead leaves. *Mycalesis* has apparently little taste for flowers, but may often be seen at overripe berries and the sap of various plants. The wet and dry forms differ considerably, but they overlap to a great extent, and the butterfly also varies individually, the white stripe across both wings on the underside of the d.s.f. being sometimes very broad and distinct, sometimes very little developed; the same is the case with the ocelli on the upperside.

Fig. 9, Pl. II is from a ♂ taken in January or d.s.f., Fig. 10 is the underside of a ♂ taken in May or w.s.f. The sexes are alike, but the ♂ has a tuft of hairs on the upperside of the hindwing, near the anterior margin, usually hidden by the forewing but sometimes erected fan-wise.

Egg, globular, smooth, greenish-white; attached singly to the blades of several kinds of grasses and reeds, generally on the underside of the leaves.

Larva, figured on Pl. 1a, Fig. 13, pupa Fig. 14. Just hatched the larva is entirely white, except the head which is brown. The larva is figured not quite fullgrown, when it changes from green to a uniform ochreous brown, with a very faint dorsal band, and one lateral band each side, still less distinct. Spiracles black but indistinct, and a faint diagonal marking on each segment each side. The upper surface also has a few irregularly scattered black specks. It feeds on *Kyllingia monocephala*, Rottb., and *Mariscus albescens*, Gaud., both widely spread tropical sp., Nat. Ord. *Cyperaceæ*, and on *Ischæmum ciliare*, Retz., Nat. Ord. *Gramineæ*, common in the tropics of S. E. Asia. The larvæ are extremely sluggish, resting for hours in the same position, sometimes two or three days in the dry season. One larva I bred was pupating on February 2nd, having attached itself in the usual manner, when a sudden spell of very cold weather set in; it remained in a torpid condition till the 13th, when the sun shone and the day was fairly warm: it then pupated actually. The butterfly emerged March 19th.

Melanitis leda, Linn.

On the wing throughout the year, and the two seasonal forms, though overlapping, differ greatly in the colouring of the underside and form of apex of the forewing; the winter or d.s.f. used formerly to be distinguished as *M. ismene*, Cram. It is a very common butterfly here, frequenting shady localities, especially the dead leaves under trees, where it rests with closed wings, often inclining at a noticeable angle to the surface it rests on, as also does *Mycalesis*. It flies chiefly at sunset, erratically and swiftly, suddenly dropping on the ground in a manner very difficult to follow with the eye. In the evening it is very fond of an avenue of large trees, flying swiftly but unsteadily and every now and then settling or rather dropping in the dust of the road. *Melanitis* is not a flower-lover, but may occasionally be seen feeding on sap of plants or overripe fruits. A very full account of the seasonal dimorphism of this butterfly at Hongkong is given in a paper by the late Jenner-Weir, F.L.S. (Proc. South Lond. Ent. Soc. 1892-3). In the d.s.f. the ocelli on the underside become nearly or quite obsolete or merely indicated by a small dot; the under surface exhibiting instead a remarkable range of colour and marking, some specimens being clouded and marbled with various shades of purple, red, brown and yellow—in fact all the tints of decaying leaves—whilst others are almost uniform ochreous, or with one or two conspicuous black spots or markings. Perhaps, as Walker in his *List* hints, the soil of certain localities has some influence on their colouration, communicated, it may be, through the foodplant of the larva; since specimens from special places, though varying individually, generally exhibit some predominant colour in common. The d.s.f. has the apex of the forewings much produced, almost hooked, the median angle of the hindwing largely accentuated, in a few individuals developed into a real "tail," as large as that of many specimens of *Papilio agamemnon*; the upperside scarcely changes, except that the ocellus in the forewings is often largely developed. The sexes are similar, but the ♀ is usually larger and has the ocelli better marked, especially that on the upperside of the forewing. The d.s.f. of both sexes is generally much larger than the other form. This butterfly, like many Satyrids, is often very light-coloured on the upperside, inclining to ochreous.

Fig. 2, Pl. III is from a ♂ taken in June, Fig. 3 a ♂ taken in January.

The larva is figured on Pl. 1a, Fig. 9, pupa Fig. 10. The larva feeds on *Rottboellia exaltata*, Linn. f., Nat. Ord. *Gramineæ*, widely distributed in the tropics, but it probably feeds also on other grasses. The sp. mentioned is a stout plant growing upwards of three feet and is armed on the stem and leaf-sheaths with stiff siliceous hairs. The leaves have a white mid-rib.

When young the larvæ are to some extent gregarious.

Melanitis aswa, Moore.

Commander Walker saw but one specimen of this sp., taken in the autumn at Kowloon. I have not come across it.

Ypthima avanta, Moore.

On the wing throughout the year and very abundant, the seasonal forms differing widely; the w.s.f. with the ocelli on both upper and underside large and distinct; in the d.s.f. obscure on the upper and practically obsolete on the underside, except the large apical ocellus in the forewing, which remains distinct on the underside. This insect also varies much in size and tint, some individuals differing so greatly as to appear distinct species. Though somewhat resembling *Mycalesis* in general appearance, its habits are quite different, for it is fond of flowers and sunshine, is altogether diurnal, and though chiefly frequenting open, grassy country is for ever on the move, wandering on and on with a devious but not strong flight, now and then disappearing for a few moments amongst undergrowth. Though sombre in colouring it is a lively little butterfly, evidently easily pleased and contented, for it visits the smallest and most inconspicuous flowers, or feasts on the gummy secretions of various grasses. The sexes are alike, but the ♀ is usually the larger and the ocelli larger and brighter than in the ♂. When resting this insect generally closes the wings, but sometimes it expands them fully, occasionally slowly fanning with them, especially when on a flower or a bare patch of ground in the sun.

Fig. 4, Pl. III is from a ♀ taken in May, below which is figured the upperside of a ♂ taken in February; Fig. 5 is from an unusually small and light-coloured ♂ taken in March. One specimen I bred had the outer rings of the ocelli on the underside of the left hindwing coalescing and running out to the margin, forming a continuous yellow ochre patch; the right wing was normal.

Egg, globular, smooth, yellowish, laid on grass blades, sometimes two or three close together on one leaf.

Larva, just hatched purplish, slightly hairy, head brown. Figured on Pl. 1a, Fig. 15, pupa Fig. 16. The larvæ are sluggish in their movements: they feed on various grasses, amongst which are *Ischænum ciliare* and *Kyllingia monocephala*. The abdominal segments of the pupa are very distinctly ridged.

SUB-FAM. MORPHINÆ (AMATHUSIINÆ).

1. GENUS DISCOPHORA.

2. GENUS CLEROME.

A group of butterflies confined to the Oriental, Neotropical and Australian Regions, but chiefly represented in the two former.

Discophora tullia, *Cram.*

Not very common, and flies chiefly in the evening, being fond of resting on foliage in shady nooks in the daytime. It does not frequent flowers, but may be seen feeding on overripe fruits. It is on the wing almost throughout the year, and has a quick and devious but unsteady flight, generally near the ground amongst bushes and thick cover. It seldom settles actually on the ground, however, except when feeding on fallen fruit. As noted by Walker in his *List* the females seem on the whole to be commoner than the males, which may be partly due to the fact that the ♀, as in the case of *Lethe*, is abroad at any time of day when searching for a spot to lay her eggs, and is therefore more often seen. There is little if any seasonal change in this insect. The ♂ has a curious sub-circular thickly-scaled patch, like close-cropped hair, on the upperside of the hindwing, partly in the disc. cell. The ♀ is usually much larger than the ♂. When freshly emerged from the pupa the wings of both sexes have a distinct purple flush in certain lights.

Fig. 7, Pl. III is from a ♂ taken in August, Fig. 8 from a ♀ taken in June.

The larva is figured on Pl. 2a, Fig. 1, pupa Fig. 2. The pupa is often a rather dark green instead of flesh colour as figured, but pupæ of either colour may be ♂ or ♀ indifferently, which is also the case with some other butterfly pupæ.* The larva is very hairy, and this and its peculiar colour pattern make it resemble the larva of a moth rather than a butterfly. In its habits, too, it reminds one of many moth larvæ, for it fixes two or three leaves together with a few stitches of silk, lining the interior with a loosely-spun web, and spends its hours of rest in this shelter: two larvæ sometimes occupying the same tenement, also moulting therein; but this habit it does not develop till about half-grown. It feeds on the scrub varieties of bamboo. When young and until about half-grown the larvæ are of a general dark purple-brown, nearly black, each segment ringed with yellowish-white; the hairs are whitish and rather long, but much more sparse than in the full-grown larva. Whilst young they are gregarious, many feeding close together on the same leaf.

The projection at the head of the pupa is cleft for some distance up, but the two parts are close together, and touch at the tip.

Clerome eumeus, *Drury.*

A common butterfly here, diurnal in habit, but preferring dark, shady places and generally keeping to woods, though in common with other butterflies it sometimes meanders into towns, and

**Danaus chrysippus* for instance. Since the article on that butterfly was written, I have come across two larvæ with four pairs of tentacles, the abnormal pair being small and on the fourth segment.

may frequently be seen in the streets of Hongkong. It is on the wing throughout the year, probably having a brood every month. *Clerome* has a rather weak and flapping flight, but twists and winds between tree-trunks and through thickets, generally not far from the ground. It rests with closed wings, showing the circular white spots on the underside; apparently not trying specially to conceal itself, though it is rather conspicuous when resting on a leaf, but I have never seen it attacked by anything. It occasionally blunders into a spider's web, but probably very seldom falls a victim to the mantis, as I do not remember seeing *Clerome* feed at either flowers or fruit, where the mantis generally waits in ambush. The largest and commonest mantis here is *Hierodula saussureii*, Kirby, and the vigorous and lightning snatches of this insect account for many torn and ragged butterflies which have managed to escape. *Clerome*, however, though not partial to flowers, sucks up secretions from leaves of plants and is fond of sitting on damp ground, drinking up the moisture. This butterfly has rather soft-textured wings and is liable to malformation of them. It seems to be confined to South-east China, and to inhabit a restricted area there, though very plentiful where it occurs. It does not vary seasonally. The sexes are similar, but the ♂ has a tuft of hairs on the upperside of the hindwing at the edge of the disc. cell, next the body: usually concealed by the inner margin of the forewing, but capable of being erected and expanded fan-wise at will. The ♀ is generally much larger than the ♂, and the suffused orange in the forewing is brighter and extends over the apex nearly to the margin. The costal nervure of the forewing is somewhat dilated at the base in this insect.

Fig. 9, Pl. III is from a ♀ taken in February, and Fig. 11, Pl. VII is from a ♂ taken in May.

Egg, globular, smooth, dirty white; twenty, thirty or more are attached to the underside of a leaf of the foodplant, close together but not actually touching each other. Occasionally one comes across a monstrosity of two or three eggs formed into a two or three-lobed mass, such as is sometimes found in the eggs of birds.

Larva and pupa are figured on Pl. 1a, Fig. 17. The larva just hatched is white with a black head. When young the larvæ are gregarious, lying close together on the underside of a leaf, eating side-by-side with scarcely room to move their heads. When nearly fullgrown, half-a-dozen or so will often rest parallel to and touching one another. Just before pupation the larvæ turn a dirty greenish-white. They feed on *Smilax lanceifolia*, Roxb., a climbing and twining plant native to south-eastern Asia, Nat. Ord. *Liliaceæ*; also, but less frequently, on *Pandanus odoratissimus*, Linn., f., a common and exceedingly prickly plant much employed as hedges for gardens, native to the shores of the southern Pacific, Nat. Ord. *Pandanaceæ* or Screw-pines.

The pupæ of both *Satyrinæ* and *Morphinæ* are attached by the tip of the abdomen, without any band round the middle. The imagines of these two groups, except *Ypthima*, usually rest with closed wings.

SUB.-FAM. NYMPHALINÆ

- | | | |
|-----|-------|----------------------|
| 1. | GENUS | CETHOSIA |
| 2. | „ | CUPHA |
| 3. | „ | CIRROCHROA |
| 4. | „ | CYRESTIS |
| 5. | „ | ATELLA |
| 6. | „ | SYMBRENTHIA |
| 7. | „ | ARGYNNIS |
| 8. | „ | VANESSA |
| 9. | „ | RHINOPALPA |
| 10. | „ | PRECIS (JUNONIA) |
| 11. | „ | HYPOLIMNAS (DIADEMA) |
| 12. | „ | ERGOLIS |
| 13. | „ | NEPTIS |
| 14. | „ | ATHYMA |
| 15. | „ | LIMENITIS |
| 16. | „ | EUTHALIA (ADOLIAS) |
| 17. | „ | APATURA |
| 18. | „ | HESTINA |
| 19. | „ | CHARAXES |

The *Nymphalina* compose the largest group of butterflies and are universally distributed, but many of the genera are confined to particular Regions. *Cethosia*, *Cupha*, *Cirrochroa*, *Atella* and *Symbrenthia* are Oriental and Australian; *Argynnis* and *Vanessa* range widely, and though represented in the Oriental Region are mainly Palearctic and Nearctic; *Precis* (the Old World representatives of the New World *Junonia*) *Hypolimnas*, *Neptis* and *Charaxes* are common to the Eastern tropics. *Ergolis* is Oriental and Ethiopian. *Athyma* and *Euthalia* are Oriental; *Limenitis* is a wide-ranging genus extending to Europe and America, but chiefly Oriental; *Apatura* occurs in every Region but the Ethiopian and Australian. *Hestina* though represented in the Oriental Region is mainly Palearctic.

This large and heterogenous group of butterflies includes insects differing widely in their habits and characteristics, which it is impossible to generalise for the whole Sub.-fam.; *Ergolis* and *Hestina* are perhaps the most peculiar genera.

Cethosia biblis, Drury.

A very conspicuous, not very common butterfly here, which meanders swiftly over country covered with scrub or along the outskirts of woods, usually rather near the ground. It appears to skim over the ground with short but rapid vibrations of the wings. It does not seem specially fond of flowers, but usually rests on foliage. Walker says it is stated to be common on Waglan, a very small island about twenty miles S. E. of Hongkong, where the larva is said to feed on *Passiflora fetida*, Linn., Nat. Ord. *Passifloræ*, a naturalized S. American plant. This insect has two forms of ♀, differing widely in colouration but agreeing in the pattern or markings. The ordinary form of ♀ is similar to the ♂, the second or gray form being rare. *Cethosia* occurs almost every month in the year and is a wandering butterfly. The ♂ is of a most vivid red, and makes one wish it were a gregarious and more sedentary insect. A gathering of *Cethosia*, such as one sees of *Danais* or *Euplœa* would be a gorgeous spectacle. The figure of the larva of another sp., *C. cyane*, given in Horsfields *Cat. Lep. in Ind. Mus.* has two rather long simple processes or horns on the head, and two rows of rather shorter and slenderer simple dorsal processes, two in each segment; the body is dark, boldly banded transversely with light colour on each segment.

Fig. 4, Pl. V is from a ♂ taken in November, Fig. 5 from a ♀, second form, taken in February.

Cupha erymanthis, Drury.

A very common butterfly, on the wing throughout the year in more or less abundance; generally keeping to woods and thickets, especially the outskirts and paths through them. It seems only moderately fond of flowers, but may always be found at *Lantana* and in shady gardens. It can fly fairly swiftly but seldom takes long flights, often resting with expanded wings on a leaf at a moderate height from the ground, whence it makes short excursions, returning again to the same perch. It often haunts the same locality for several days. The sexes are similar, but this insect has a wide range in dimensions, and varies slightly seasonally. Like many other butterflies which are fond of some special perch, *Cupha* generally chases passing butterflies and even dragonflies.

Fig. 6, Pl. III is from a ♀ taken in January.

Egg, whitish, globular, dented in axial lines, laid singly on the underside of leaves of the foodplant of the larva, *Scolopia chinensis*, Clos., Nat. Ord. *Bixaceæ*, a shrub or small tree common to S.E. Asia and the Philippines.

The larva, which will be figured later in black-and-white, is of a general shiny dark yellow-brown, with two rows of dorsal spines and two lateral rows each side, long, slender and finely spined laterally up the stems. A whitish lateral line just above the legs divides the upper and under surfaces. Head shiny dark yellow, with a black marking each side of the face. After the last moult the larva is of a shining emerald green, the spines very pale blue, marked with black where the lateral spinelets spring, black at the base and ringed with pale blue on the body. The larvæ are very quick in their movements, active and restless and when young will only feed on the very tender fresh leaves and shoots of their foodplant, which are always infested with ants and other creatures, attracted by the moisture or sap of the new leaves, but also on the lookout for eggs and very young larvæ. In some stages the larva of *Cupha* is hardly distinguishable from that of *Atella phalantha*.

The pupa is almost exactly like that of the above-mentioned butterfly, and is attached by the tip of the abdomen only.

Cirrochroa satellita, Butler.

Commander Walker says in his *List* that one specimen of this butterfly, from Honkong, is in the collection of Messrs. Godman and Salvin.

Cirrochroa mithila, Moore.

Scarce, but an insect which seems to occur sporadically, generally in May and June, when I have sometimes taken a dozen within a few days; some years it does not seem to put in an appearance at all. Its flight rather resembles that of *Cupha* but is stronger, and it seems to be rather a wandering butterfly. It likes the vegetation under large trees and the fringe of woods, being very fond of settling on the underside of a leaf with closed wings, sometimes on the upperside with fully expanded wings. This butterfly seems to like *Lantana* flowers, but chiefly frequents foliage. It is an insect which gets into a very worn and ragged condition, the greater part of those seen here being in that state. The ♂ in a fresh condition is almost as bright an insect as *Atella*, but the wavy marginal markings on the upperside vary in distinctness in both sexes, some specimens having them very black and continuous, others faint and broken.

Fig. 12, Pl. III is from a ♂ taken in June, Fig. 10, Pl. VII from a ♀ taken in May.

Cyrestis thyodamas, Boisduval.

This insect I have only recently taken, and was obliged to figure separately; the drawing is interesting as a specimen of Japanese colour-printing in this class of work, and I venture to think rivals the best European examples. *Cyrestis* is a genus common to the three Eastern tropical



CYRESTIS THYODAMAS, *Boisd.*



Regions, but of its habits I can say little, as the specimen figured, taken near Macao, is the only one I have seen alive. It appeared to be very fond of settling with closed wings on the underside of a leaf, very much after the manner of *Cirrochroa*; it is rather a striking butterfly in flight, though it does not appear to fly rapidly, but rather erratically like many day-flying moths. It is a forest-dweller, and therefore probably a mere accidental visitor here.

Atella phalantha, Drury.

Usually a common insect here, but some years very few are to be seen. This year (1905) it has been very scarce, and even *Cupha erymanthis*, usually one of the commonest butterflies here, has fallen off greatly from its general abundance; the larvæ of these two butterflies have the same foodplant. *Atella* is a very lively insect with a rapid flight, often returning time after time to a special twig or leaf, whence it chases other butterflies which pass. This insect is peculiarly liable to have the hindwings snapped, perhaps by a bird but more often probably by a lizard; one species in particular, *Calotes versicolor*, Daud., swarms in the wet season in the tops of flowering shrubs and bushes, especially *Lantana*, of which *Atella* is very fond, as it also is of many garden flowers up which the lizards climb. They may often be seen lying on the flowers of the stiff Cockscombs which the Chinese are so fond of growing. Not many birds here seem to meddle with butterflies, though the bulbuls and sparrows sometimes chase but seldom catch them. Many butterflies are supposed to be avoided by birds because of their bad taste or smell; yet *Eurystomus calonyx*, a lovely Roller common in spring and early summer, feeds chiefly on the large and brightly-coloured but (to human senses) stinking *Hemiptera* or bugs, so that the bird itself after feeding smells strongly of them.

Atella varies very much in size and also slightly seasonally, chiefly on the underside, but the sexes are similar.

Fig. 8, Pl. IV is from a ♂, rather a small specimen, taken in June.

Egg, sub-conical, striated longitudinally, yellowish; laid singly on the shoots and underside of leaves of *Scolopia chinensis*.

The larva is figured on Pl. 3a, Fig. 1, pupa Fig. 2. The larvæ of *Cupha erymanthis* and *Atella phalantha* resemble one another very closely both in appearance and habit. At each moult the larva of *Atella* is more or less mottled with white all over the upper surface, but soon changes again to uniform yellow-brown. Just before pupating it becomes a bright green.

The pupa is sometimes pinkish-white or flesh colour instead of green, and as in the pupa of *Cupha* some have the processes very long, as shown in the figure, others show little more than the base. These processes or tentacles are not pliable, but rather wiry.

Symbrenthia lucina, Cram.

Also known as *hippoclus*, Cram., but *lucina* seems to be the older name. This pretty insect is very scarce in my experience, though Walker found it common in Hongkong in 1892-3.

He says it is "usually found flitting rapidly, like a small *Vanessa*, along sunny roadsides and in gardens, settling on leaves and twigs with wings fully expanded." He found it from December to May. I have not seen this butterfly at Macao, and of late years it has hardly been observed at Hongkong. It varies a good deal in size, but the sexes are similar and the ♀ generally the larger.

Fig. 10, Pl. III is from a ♀ taken at Hongkong in August, so it is probably on the wing most of the year.

Argynnis hyperbius, Linn.

Also known as *niphe*, Linn.; *hyperbius* has priority, however. A fairly common insect here, usually to be found in gardens and waste ground; the ♀ is a most beautiful butterfly, quite different in colouration from the ♂, which on the upperside much resembles a large *Atella phalantha*. The white spots and markings on the underside of the hindwing are really white, not silver, though they have a metallic lustre. It has a swift and wandering flight, but is fond of flowers, especially *Lantana*, and the ♂ recalls the Fritillaries common in the south of England, both in appearance and habits. It generally rests with expanded and slightly fanning wings on a flower or low herbage, often settling on the ground. On the wing the ♀ bears some resemblance to *D. chrysippus*. *A. hyperbius* is an insect with a very wide range, but most of the species of this genus are Palearctic.

Fig. 6, Pl. IV is from a ♂ taken in September, Fig. 7 from a ♀ taken in the same month. It seems to occur chiefly in the autumn.

Larva, just hatched, of a general dark purple-brown, spines dull yellowish at the base. Fullgrown, cylindrical, of a general velvety black, with a broad dorsal stripe of bright chestnut or light red, narrowing slightly towards the head and last segment, which is marked with a spot of chestnut just above the anus. Six rows of spines, two dorsal and two lateral rows each side. From the head to the fifth seg. inclusive the spines are entirely black with metallic dark blue reflections; the rest are light pink or reddish for about two-thirds of their height, the other third black; all the spines are finely spined laterally up the stems, the spinelets on the pink part of the stems inclining to be concolourous, the rest black. Head dull black, slightly hairy or bristly. Legs and prolegs shining black, the latter tipped with yellowish or flesh colour. Underside black. I have only found it feeding on the garden violet, but there is a common sp. of indigenous *Violaceæ*, on which it almost certainly feeds. The larva and pupa will be figured subsequently in black-and-white.

Pupa, very angular, with two rows of large and finely-pointed processes, two on each segment down the back of the abdomen, brownish, tips black. Eight silver-gilt thoracic processes, the tips finely pointed and black; two similar processes on the head, which is obtusely cleft. General colour a dark yellow or purple-brown, with veinings of darker brown, but the ground colour varies in depth of tint, some specimens being almost black. Attached by the tip of the abdomen only, without a band.

Part III.

BUTTERFLIES
OF
HONGKONG
AND
SOUTH-EAST CHINA.

J. C. KERSHAW, F.E.S., F.Z.S.

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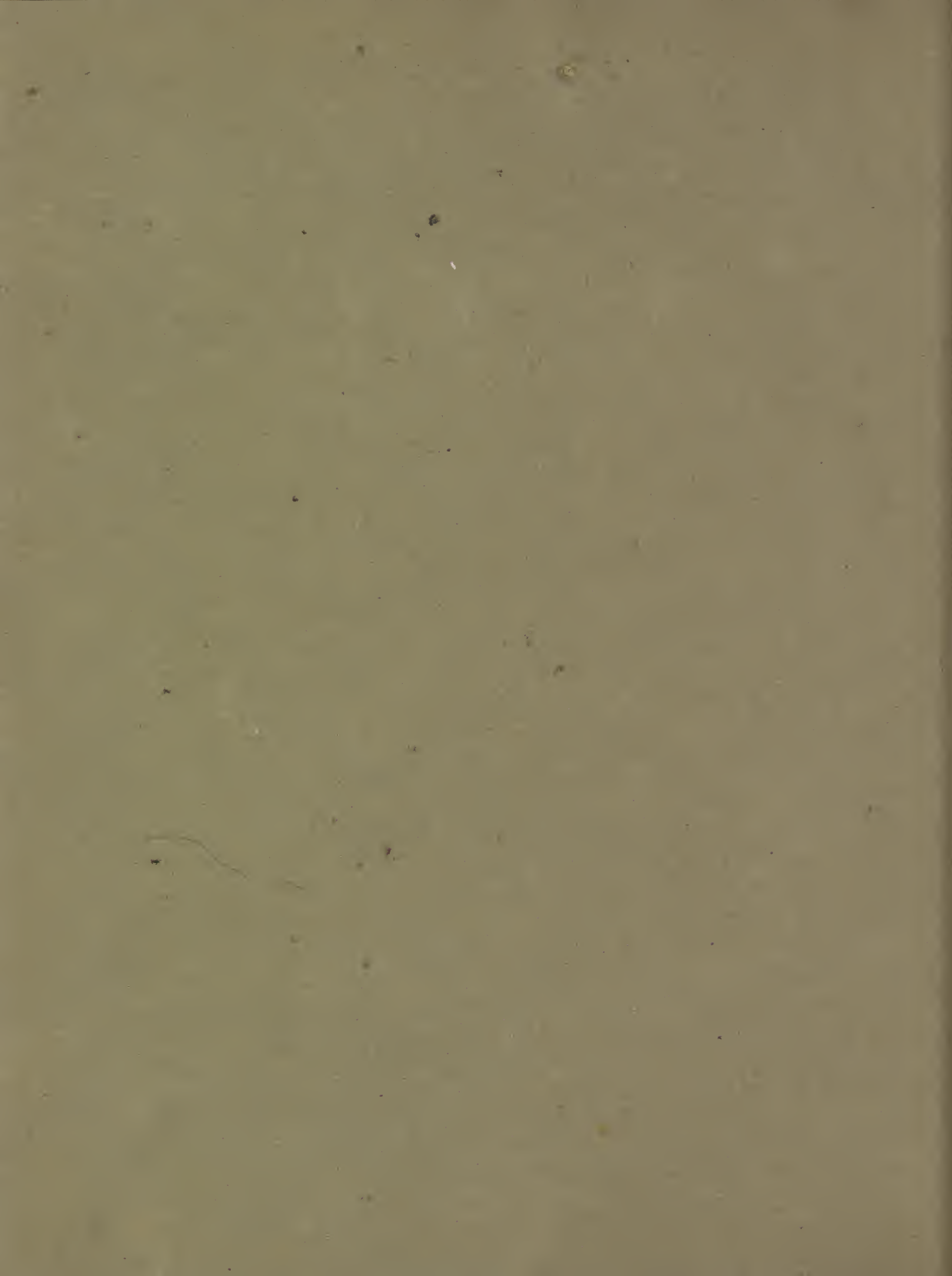




PLATE IV.

- 1.—EUTHALIA LUBENTINA, *Cram.* ♂
- 2.—EUTHALIA PHEMIUS, *Doubl. and Hewits.* ♂
- 3.—EUTHALIA PHEMIUS, *Doubl. and Hewits.* ♀
- 4.—APATURA PARISATIS, *Westw.* ♂
- 5.—APATURA PARISATIS, *Westw.* ♀
- 6.—ARGYNNIS HYPERBIUS, *Linn.* ♂
- 7.—ARGYNNIS HYPERBIUS, *Linn.* ♀
- 8.—ATELLA PHALANTHA, *Drury.* ♂
- 9.—HESTINA ASSIMILIS, *Linn.* ♂
- 10.—HESTINA MENA, *Moore.* ♀
- 11.—ATHYMA NEFTE, *Cram.* ♀
- 12.—ATHYMA NEFTE, *Cram.* ♂
- 13.—ATHYMA SULPITIA, *Cram.* ♂



HENTSCHEL-COLOURTYPE.

PLATE V.

- 1.—VANESSA INDICA, *Herbst* ♂
- 2.—VANESSA CANACE, *Linn.* ♀
- 3.—VANESSA CARDUI, *Linn.* ♀
- 4.—CETHOSIA BIBLIS, *Drury.* ♂
- 5.—CETHOSIA BIBLIS, *Drury.* ♀
- 6.—HYPOLIMNAS BOLINA, *Linn.* ♂
- 7.—HYPOLIMNAS BOLINA, *Linn.* ♀
- 8.—HYPOLIMNAS BOLINA, *Linn.* ♀
- 9.—HYPOLIMNAS BOLINA, *Linn.* ♀
- 10.—HYPOLIMNAS BOLINA, *Linn.* ♂
- 11.—HYPOLIMNAS BOLINA, *Linn.* ♀



PLATE VI.

- 1.—*ATHYMA PERIUS*, *Linn.* ♂
- 2.—*NEPTIS EURYNOME*, *Linn.* ♀
- 3.—*NEPTIS COLUMELLA*, *Cram.* ♀
- 4.—*LIMENITIS CAMILLA*, *Linn.* ♀
- 5.—*LIMENITIS PROCRIS*, *Cram.* ♂
- 6.—*RHINOPALPA SABINA*, *Cram.* ♀
- 7.—*PRECIS ORITHYIA*, *Linn.* ♂
- 8.—*PRECIS ORITHYIA*, *Linn.* ♀
- 9.—*PRECIS ALMANA*, *Linn.* ♀
- 10.—*PRECIS ALMANA*, *Linn.* ♀
- 11.—*PRECIS ATLITES*, *Linn.* ♀
- 12.—*PRECIS LEMONIAS*, *Linn.* ♀
- 13.—*PRECIS CENONE*, *Linn.* ♂
- 14.—*PRECIS CENONE*, *Linn.* ♀



PLATE VII.

- 1.—CHARAXES ATHAMAS *Drury* ♂
- 2.—CHARAXES POLYXENA *Cram.* ♀
- 3.—CHARAXES POLYXENA *Cram.* ♂
- 4.—CHARAXES POLYXENA *Cram.* ♂
- 5.—ZEMEROS FLEGYAS *Cram.* ♂
- 6.—ZEMEROS FLEGYAS *Cram.* ♀
- 7.—ABISARA ECHERIUS *Stoll* ♂
- 8.—ABISARA ECHERIUS *Stoll* ♀
- 9.—CATOPSILIA PYRANTHE *Linn.* ♀
- 10.—CIRROCHROA MITHILA *Moore* ♀
- 11.—CLEROME EUMEUS *Drury* ♂
- 12.—IXIAS PYRENE *Linn.* ♂
- 13.—HYPOLIMNAS MISIPPUS *Linn.* ♂



Vanessa (Grapta) canace, Linn.

Also known as *charonia*, Drury. A fairly common butterfly here, with the rapid flight and usual habits and characteristics of all the *Vanessæ*, including the "click" of the wings, which can often be distinctly heard. When the wings are closed its jagged outline reminds one somewhat of the "Comma" butterfly at home. It may be found at *Lantana* flowers but chiefly feeds on the overripe berries and other half-rotten fruits. It is addicted to settling on the ground, sometimes fanning its wings, sometimes keeping them fully expanded or even with the tips below horizontal: and often rests on walls, rocks and tree-trunks warmed by the sun, generally head downwards. Usually a very wary, easily scared insect, it is occasionally seized with unaccountable fits of boldness, and I have more than once seen it settle again and again on a moving jinricksha in a crowded street. It is on the wing throughout the year, though most numerous in autumn. The sexes are similar, but the white sub-apical marking on the upperside of the forewing is larger in the ♀ than in the ♂.

Fig. 2, Pl. V is from a ♀ taken in November.

Egg, sub-conical, multi-angled longitudinally, the angles whitish, the rest green. Laid singly on the upperside of leaves of *Smilax China*, Linn., a very prickly climber with scarlet berries, native to China, Cochin China and Japan, Nat. Ord. *Liliacæ*.

Larva, very young, head black, general colour shiny yellow-brown, base of spines light yellow. Later, general colour grayish maculated with dark brown, the yellow of the base of the spines suffused and almost forming a broad yellow ring on each seg. Branches of spines nearly black. Fullgrown, each seg. narrowly banded transversely with black and pale yellow, these latter bands narrower than the black. Each seg. also broadly banded transversely with orange spotted with black, the spines being set in these bands. Seven longitudinal rows of stout pale yellow spines or processes, spined laterally at the top with black and up the stems with pale yellow spinelets, the tips black. Head black, bristly with black hairs, with the suture narrowly marked in orange. The first spine of the central dorsal row is on the fifth seg., the last spine on the twelfth or penultimate segment. The two last segs. irregularly marked with black and orange, with a large sub-circular black spot above the anus. Prolegs black, ringed at the base with orange. Underside chiefly black, but banded narrowly with whitish something like the upper surface. After the later moults, when nearing pupation, the stems of the spines become white, and the pale yellow transverse bands on the body also are nearly white.

Pupa, angular, two rows of sharp processes down the back of the abdomen, and other very small processes on the dorsal surface. Head deeply cleft, the two parts sharply pointed and curved inwards. General colour deep purple-brown, variously marked with reddish; a silver marking each side of the back of the thorax, each marking divided into two by a transverse brown line. After some days the four lowest processes (just above the silver spots) become dark red-gold. Attached by the tip only, without a band.

Although the eggs seem to be always laid on *S. China*, and the larvæ are there found, yet they will generally eat several other species of *Smilax*.

The larva will be figured later in black-and-white.

Vanessa (Pyrameis) indica, *Herbst*

Probably more common than the foregoing sp.; with the same habits, though much more attached to flowers and very fond of overripe fruit. This insect reminds one somewhat of the "Red Admiral," *V. atalanta*, but it is not so large nor so handsome, and does not fly with the graceful sailing motion of that butterfly, being usually extremely rapid in its movements. It is most plentiful in autumn, and varies very much in size at any season, but the sexes are alike.

Fig. 1, Pl. V is from a ♂ taken in January.

The late Dr. Gomes da Silva informed me that the larva feeds on *Ricinus communis*, Linn., Nat. Ord. *Euphorbiaceæ*, the Castor-oil plant, which grows commonly here in waste ground, especially near villages, and sometimes attains a great size, with a woody trunk.

Vanessa (Pyrameis) cardui, *Linn.*

Not so common as the two preceding butterflies, in fact sporadic and never occurring abundantly. Though it varies much in size it is always smaller than the "Painted Lady" at home. Like the other *Vanessæ* it is very fond of settling on the ground, either with closed wings or "fanning." This very widely-ranging insect seems to occur almost the world over, and it is one of the very few New Zealand butterflies, a country which has altogether only about a dozen species.

Horsfields *Cat. of the Lep. in the Ind. Mus.* says that in Java the larva feeds on a sp. of *Artemisia*, probably its foodplant here, as two or three sp. are native to Hongkong. In England it feeds on a thistle, belonging to the same Nat. Ord. *Compositæ*, of which Bentham observes in *Flora Hongkongensis* "the most extensive family among flowering plants, and represented in every quarter of the globe, and in every variety of station." This is probably one of the causes of the wide range of *V. cardui*.

Fig. 3, Pl. V is from a ♀ taken in October. The sexes are alike. The larva is spiny, much resembling that of *V. canace* except in colouration.

Rhinopalpa sabina, *Cramer*

Apparently an accidental visitor, or very rare. The sexes are similar, but the ♀ is much the larger.

Fig. 6, Pl. VI is from a ♀ taken in May at Macao by the late Dr. Gomes da Silva, who also took a ♂ at the same time, frequenting flowers: both specimens were in perfect condition and evidently not long emerged from the pupa.

Precis (*Junonia*) *œnone*, Linn.

Also known as *P. hierta*, Fabr.

All the species of this genus, represented here, are on the wing more or less throughout the year, and have the two seasonal forms well defined; the ocelli and markings on the underside of the wet season forms giving place in the dry season to a more or less uniform ground colour. The butterflies of this genus are a conspicuous feature in the entomology of this part of China; they are all lively, most of them brightly-coloured insects, all with much the same flight and habits, in which they resemble the *Vanessæ*; but they are fond of haunting a special locality for long periods, and do not, perhaps, fly quite so swiftly as the *Vanessæ*. They are addicted to settling on the ground in the sun, especially on rather barren waste land, and are all great flower-lovers. The eggs of *Precis* are remarkably small compared to the size of the butterflies.

The present sp., *P. œnone*, is very common, frequenting gardens, sunny open grass land and waste ground. Occasionally an individual may be seen which entirely lacks the purple blotch in the hindwing, and it is often indistinct.

Fig. 14, Pl. VI is from a ♀ taken in March, Fig. 13 from a ♂ of the same month.

Egg globular, striated axially, greenish. Laid singly, usually on the upperside of leaves of the foodplant, *Barleria cristata*, Linn., Nat. Ord. *Acanthaceæ*, a plant widely spread over tropical Asia, having a large bell-shaped blue or purplish flower.

The larvæ and pupæ of the genus *Precis* are so much alike, sometimes scarcely distinguishable, that I only figure those of *P. almana*, which will serve as the type. The larvæ are all spiny, the spines generally black with metallic blue reflections, except for a short time after moulting, when they become yellow. The pupæ all have rows of small or moderate-sized processes down the back of the abdomen, all are variegated with shades of brown, pale pink, greenish and ochreous, with markings of very dark brown or black; and are attached by the tip of of the abdomen, without any band.

The chief points of difference between larvæ of *P. œnone* and *P. almana* are that the spines of the former are rather shorter, and there is an indistinct dorsal band, darker than the body-colour and slightly irrorated with whitish.

Precis *almana*, Linn.

The wet season form of this insect was at one time distinguished as *P. asterie*, Linn. It is a very common and showy butterfly, whose seasonal forms differ both in marking and outline; the wing-tip of the d. s. f. being strongly produced, almost hooked, and the hindwings developing an anal lobe, almost a "tail"; whilst the ocelli on the underside of the w. s. f. become practically obsolete. The d. s. specimens are generally the larger. *P. almana* has the usual habits of the genus, and graces even the smallest town garden with its presence. Most of the

Precis group, like *Danais*, are so numerous, fond of flowers, and absorbed in feeding that they haunt the same patches of flowers day after day and add immensely to the interest and beauty of a garden. Nor do the larvæ of butterflies here work any material damage in gardens, as there are exceedingly few cultivated flowers on which they feed, though the case is otherwise with moth larvæ, some of which are very destructive. Walker found this butterfly at Hangchau, Haining and Shanghai, the specimens being larger and finer than those from Hongkong and other tropical parts; but some of the d. s. forms here attain a large size.

The sexes are alike. Fig. 9, Pl. VI is from a ♀ taken in November or d. s. f.; Fig. 10 from a ♀ of June or w. s. f.

Egg, globular, green; laid singly and usually on the upperside of leaves of the foodplant, *Ruellia repens*, Linn., Nat. Ord. *Acanthaceæ*, a native of Burmah and Malaya.

The larva is figured on Pl. 3a, Fig. 7, pupa Fig. 8. The larva may be distinguished from other *Precis* larvæ by the second, third and fourth segs. having a deep black dorsal patch, sufficiently differentiated from the purple-black body-colour.

Precis lemonias, Linn.

Not so abundant as the two former sp., and seems to range more widely, not very often frequenting a locality for any length of time. The d. s. f. sometimes exhibits very pretty shades of pink on the underside, instead of the usual ochreous colour which replaces the ocelli and most of the markings of the w. s. f. It is a most erratic butterfly in the manner of laying its eggs, and will deposit them on almost any small plant, grass-blades or even clods of earth. It varies much in size at any season, but d. s. forms are usually the larger.

The sexes are similar, the d. s. females being sometimes very large. Fig. 12, Pl. VI is from a ♀ taken in July.

Egg, globular, green; laid singly as above stated, but the foodplant is *Ruellia repens*.

Larva, just hatched, yellowish-brown, sparsely clothed with long dark hairs, as are the other *Precis* larvæ when newly hatched. Fullgrown it is hardly distinguishable from the larvæ of the two following species, having no distinct dorsal line nor any special markings.

Precis atlites, Linn.

Also named *laomedea*, Linn. This insect seems to be sporadic in its appearance here, though generally very common round Macao, very scarce at Hongkong. For the last five years it has been one of the commonest butterflies at Macao; this year—1905—I have not seen a single specimen, and *P. lemonias* has also been exceedingly scarce. It perhaps migrates locally in S. China, when its foodplant is abundant or scarce as the case may be in any particular district. When the plant is scarce it appears to be monopolised by larvæ of *P. almana* and *P. orithyia*. *P. atlites* has the usual habits of the genus, often frequenting the same flowers and locality for

days together. Like *P. lemonias* it lays its eggs in a most careless or haphazard manner, and whilst watching a ♀ laying it has even deposited two or three eggs on my hand; it frequently lays them on small clods of earth; strangely enough I have not seen it lay on its proper foodplant, though it may have been growing not a yard away. It may be that this peculiarity has something to do with the periodic scarcity of this and the former insect; many of the young larvæ perhaps perishing before they can reach their foodplant.

The sexes are alike. Fig. 11, Pl. VI is from a ♀ taken in October.

The egg, larva and pupa are the usual *Precis* type, the foodplant of the larva being *Ruellia repens*.

Precis orithyia, Linn.

A beautiful and very common insect, with the usual *Precis* habits. The d. s. f. of the ♀ is often very large, and the ocelli in the hindwings on the upperside greatly developed. The ♂ does not appear to vary so much in size, and the ocelli on the upperside of the hindwings are small, but the expanse of blue is large and brilliant. The small red transverse bands in the disc. cell of the ♀ are usually very distinct.

Fig. 7, Pl. VI is from a ♂ taken in June or w. s. f., Fig. 8 from a ♀ of November or d. s. f.

Egg, small, globular and green; laid singly on the foodplant, *Striga lutea*, Lour., Nat. Ord. *Scrophularineæ*, a curious, stiff little plant with a small yellow flower, frequent in tropical Asia and Africa; a parasite on grass roots. The larvæ will also feed on *Ruellia repens*, but the former seems to be their usual foodplant here.

Both larva and pupa are scarcely distinguishable from others of the genus, but the spines of the larva are perhaps rather longer than those of the other species here.

Hypolimnias (Diadema) bolina, Linn.

This is a very interesting genus, represented here by two sp., both of very wide range. *H. bolina* exhibits the most extraordinary variation in size and colouration and marking of the females, and to a much less extent in the males also. A few varieties of ♀ are figured on Pl. V, but there are many more intermediate variations. In one instance, breeding from a batch of some twenty eggs laid by one ♀, twelve butterflies matured, and these were all ♀ and all resembled the parent ♀, but my experience of breeding this insect is limited. A ♀ taken in September 1904 agrees generally with Fig. 9, Pl. V, but the lower part of the forewing, including part of the disc. cell and outwards to the marginal white spots, downwards to and including the inner margin, is deep but bright ferruginous or burnt sienna. This colour also appeared on the underside in the same approximate position, but paler. *H. bolina* is a moderately common butterfly here, occurring every month in the year; much attached to foliage and gardens, but not particularly fond of flowers,

though it frequents *Lantana*. It has a pretty, sailing flight but when disturbed flies very swiftly. Some forms of ♀ might be mistaken on the wing for *Euplœa anymone*, and others for *Papilio clytia*, form *panope*. The ♂ is a splendid insect in certain lights; at other times the brilliant blue surrounding the white patches appears black.

The foodplant of the larvæ is a little low-growing, inconspicuous plant spreading over the ground and scarcely rising more than four or five inches. The plant seems very common on waste ground and gardens which have lain fallow for a season—places which are trodden over every day by men and buffaloes, played on by dogs and children and scratched over by fowls, pigs and people raking together a few straws for firing or fodder. Many of the eggs, larvæ and pupæ must thus be destroyed.

H. bolina is one of the very few butterflies in New Zealand.

Fig. 6, Pl. V is from a ♂ taken in June; the males vary greatly in size at all times of the year. Fig. 7, is a ♀ of May; Fig. 8, a ♀ of June; Fig. 9, a ♀ of August; Fig. 10, a ♂ of April; Fig. 11 a ♀ of September. These varieties are found independently of the time of year.

Egg, globular and smooth, but multi-angled axially, the angles whitish, the general colour greenish. Laid in batches of two or three or more close together on the underside of leaves of the foodplant, *Alternanthera sessilis*, Br., Nat. Ord. *Amarantaceæ*, a plant with rather succulent stems, common in all tropical regions.

Larva, just hatched yellowish-brown, with a few long dark hairs on the back; head black. Whilst young they are partly gregarious. Fullgrown, black; three lateral rows each side of dark yellow spines with dark brown spinelets up the stems; one central dorsal row which extends only from the fifth to the penultimate segment inclusive. A row of very small double spines each side just above the legs, also yellow. All spines on the second seg. are very small. Head shiny dark yellow, slightly hairy or bristly, with a black spot each side of the face. Two rather long and stout black spines on the head, spined laterally up the stems. Legs, prolegs, posterior claspers and patch above anus dark yellow. Underside black. After the last moult the larva usually shows an interrupted lateral band of light colour just below the spiracles, which are black, and the spines become darker yellow or brownish.

Pupa, sub-angular, with three rows of sharply-pointed processes on the back of the abdomen, the central row small, with a pair of rather larger processes outside the outer rows each side, near the wing-cases. Head bluntly cleft. General colour nearly black, patched and variegated with ochreous and whitish. Attached by the tip of the abdomen without any band. It much resembles *Precis* pupæ, but is more angular about the head, and the processes are larger and sharper.

The larva will be subsequently figured in black-and-white.

Hypolimnias misippus, Linn.

Seems to be rare and very irregular in its appearance here. For some six years I never saw this butterfly here till, in 1904, several were taken at Macao between May and November. The following year it was again hardly to be seen in this district. It is a very remarkable insect, for though the ♂ is not unlike the ♂ of *H. bolina*, the ♀ is an almost perfect mimic, both in marking and colouring, of *Danaïs* (*Limnas*) *chrysippus*, and the females seem to vary greatly in size, which is also the case with the *Danaïs*. *H. misippus* is a butterfly with a wide distribution, occurring in many parts of the world but apparently nowhere very abundant, except perhaps in S. Africa, where *D. chrysippus* is also very numerous. The present insect has the flight and habits of the foregoing sp., and is fond of *Lantana*, both flowers and foliage. When the ♀ is in company with the *Danaïs*, as I have seen it when flying slowly over and feeding at flowers, it is almost impossible to distinguish between them; at other times its flight is often very swift, like that of the ♂. The ♂ is fond of resting in the shade on the underside of a leaf.

Fig. 13, Pl. VII is from a ♂ taken in May; Fig. 1, Pl. VIII from a small ♀ taken in June. Other specimens are much larger, one taken in September measuring four inches over the forewings.

Ergolis ariadne, Linn.

Usually a very common insect here, occurring throughout the year, but occasionally it seems to fail altogether. It has rather a weak flight and likes to rest on foliage, but it is also rather partial to *Lantana* flowers, though not often seen at any other kinds. It frequents waste ground, roadsides bordered with vegetation and the outskirts of villages, where the Castor-oil plant frequently grows, and generally flies not far from the ground. *Ergolis* has a curious thickening or dilation of the costal nervure at the base, very much like the dilated base of the sub-costal and median nervures in the *Satyrinæ*, and seems to be closely allied to the *Elymninae*, a small group of butterflies chiefly inhabiting the Malay Archipelago, and which are related to the *Satyrinæ*. The sexes of *E. ariadne* are very similar, but the ♂ has the two first sub-costal nervules of the hindwing white on the upperside; the ♀ is usually lighter or yellower in colour on the upperside, lighter generally beneath and often minutely irrorated with whitish, especially on some of the light-coloured bands of the hindwings. *Ergolis* usually rests with expanded wings, or even with the tips drooping below the body. It seems to be liable to creasing and malformation of the wings. There is no perceptible seasonal variation.

Egg, sub-globular, but somewhat pointed at the top, striated axially, green; laid singly on the underside of leaves of the foodplant, *Ricinus communis*, a common plant in many hot countries, said to be originally a native of Western Asia or Africa.

The larva is figured on Pl. 3A, Fig. 3, pupa Fig. 4. Just hatched the larva is of a yellow-brown, and the two spines on the head are no longer than those on the body. The larvæ generally rest in full view on the upperside of the leaves. The pupæ vary in general colour, some being pinkish, others greenish.

Neptis eurynome, Linn.

Also known as *leucothoë*, Cram. One of the commonest and most elegant butterflies here, its pattern of black-and-white rendering it very conspicuous. It has a curious and pretty but not strong flight, alternately moving its wings rapidly and then sailing along with them extended and motionless. It generally keeps much to the same locality, where it often rests on foliage with open wings or with the tips slightly below horizontal, like *Ergolis* and a few other butterflies. It is not specially fond of flowers, but may often be seen sucking the overripe berries of *Lantana* and the exudations of bamboo and other plants. I have also seen three or four together feasting on the carcass of a cicada, and on the dead locusts still clinging to plants, which abound at certain times of the year. *N. eurynome* is occasionally seized by the head by a little white or yellow hunting—or rather ambush—spider, which conceals itself amongst flowers. When resting in the centre of a white or yellow flower this spider can hardly be detected till it moves. *Neptis* is also sometimes caught by the tongue or proboscis by an ant, whilst probing a flower, and I have seen this butterfly distractedly flying about with an ant clinging to the tip of its tongue.

Fig. 2, Pl. VI is from a ♀ taken in May. The sexes are alike, and on the wing all the year round and in almost every locality. Though it hardly differs seasonally it varies greatly in size at all times of the year.

Egg, sub-globular or somewhat hemispherical, granulated, slightly bristly, green; usually attached singly to the upperside of a leaf-tip of the foodplants.

Larva, figured on Pl. 2a, Fig. 11, pupa Fig. 12. The larva feeds on a large number of different plants, but chiefly on *Canavalia gladiata*, D.C., and *Rhynchosia volubilis*, Lour., trailing and climbing plants of wide tropical range; also on *Desmodium pulchellum*, Benth., *Pueraria thunbergiana*, Benth., and on a sp. of *Lespedeza*, all five plants Nat. Ord. *Leguminosæ*. It also feeds on *Trema amboinensis*, Bl., Nat. Ord. *Urticæ*, and on *Sterculia lanceolata*, Cav., Nat. Ord. *Sterculaceæ*. It probably feeds on other plants too, but though many are of wide range they all appear to be limited to tropical or sub-tropical regions. The larvæ when young eat curious zig-zag channels in the broad thin-textured leaves of *Canavalia*, and also usually eat away down each side of the mid-rib, leaving this projecting, the larva generally resting at the end thereof.

The pupa is mother-o'-pearl colour; the angles, spiracles and neurulation of the wings marked out in pale gilt, denoted in the figure by yellow. It is attached by the tip without a band.

Neptis columella, Cram.

Common, but not so abundant as the former insect. It has much the same habits as *N. eurynome*, though its flight is rather stronger and it usually rests higher up on bushes and trees, being seen but seldom at flowers. The sexes are similar, but the ♀ is generally lighter in

colouring, both on the upper and underside. There is generally a distinct tinge of pink about the white markings on the underside of this *Neptis*, and there is much variation in size, though not so marked as in the foregoing species. This butterfly is to be seen throughout the year.

Fig. 3, Pl. VI is from a ♀ taken in July.

Egg, hemispherical or bee-hive shape, granulated and bristly, darkish green; attached to the upperside of a leaf-tip of the foodplant, *Cratoxylon polyanthum*, Korth., a shrub or small tree native to Malaya and S. China and very abundant in this district: Nat. Ord. *Hypericineæ*.

Larva, figured on Pl. 2a, Fig. 13, pupa Fig. 14. When young the larva eats away the leaf-tip, leaving the mid-rib, and on this projecting stalk it usually rests, near the end. The larva appears to use a large quantity of filament as footholds, and its excreta collect at the bitten edge of the leaf, suspended by and mixed up with the silk; it is thus much easier to detect the larvæ when very young than when fullgrown. The larvæ of *Athyma*, and to some extent *Limenitis*, have the same habits. When fullgrown the larvæ of both sp. of *Neptis* usually rest with the face pressed flat on the leaf.

The four spots coloured blue in the figure of the pupa indicate silver.

Athyma nefte, Cram.

A very pretty and fairly common butterfly, but rather local, haunting woods and the patches of trees round villages, where it is fond of sitting high up on the leaves; it sometimes visits *Lantana* flowers and likes those of certain trees and shrubs. It has a swift flight, but often affects a special perch whence it makes excursions. It is on the wing almost throughout the year. The ♂ and ♀ differ widely both in shape and colouring. The ♀ is fond of settling on damp soil, probably drinking up the moisture. At a distance the ♀ might be confused with *Symbrenthia*.

Fig. 12, Pl. IV is from a ♂ taken in June, Fig. 11 a ♀ taken in November. There is little seasonal variation in this butterfly.

Larva, figured on Pl. 2a, Fig. 9, pupa Fig. 10. When very young the larva is of a dark brown. After its later moults it is, for a short time, beautifully variegated with green and yellow, blue spots, dark markings and blotches, the processes or studs on the face turning a light blue. Just before pupation it changes to a dirty yellowish-white. The larva feeds on *Glochidion eriocarpum*, Champ., only known from S. China, and *G. macrophyllum*, Benth., a common shrub in China. The parts coloured yellow in the figure of the pupa indicate gilt. It has an extraordinary dorsal process, resembling the nose or beak on the pupa of *A. perius*, but much more developed, the tip of the beak being produced till it touches an opposed smaller process, leaving an opening between this appendage and the body of the pupa. At the head are two kite-shaped projections pointing in opposite directions. The pupa is attached by the tip only, without a band.

Professor Poulton informs me of a very curious fact concerning pupæ—briefly, that the pupal eyes, wings and other organs are not identical in form and structure with the imaginal organs contained within them, but are far more ancestral in type; “they are remnants of a time when the last stage of metamorphosis in the ancestors of Lepidoptera was something very different from a butterfly or moth.” This quotation is from “The External Morphology of the Lepidopterous Pupa” in the Trans. Linn. Soc. 2nd Ser. Vol. V. Pt. 5, a paper which will be found most suggestive to many who find more interesting and valuable work in Entomology than mere collecting and naming. It thus appears that some of the strange pupal appendages we see are practically of no special use nowadays: * archaic relics of a time when they were essential parts of the insect; a time perhaps dating long before the Tertiary period, for it appears that many genera of butterflies were already well differentiated in Tertiary ages, and have come down to our own times practically unchanged in their characteristics, whilst it seems probable that family types may have originated in Secondary times, and some perhaps even in Palæozoic ages. Very few fossil butterflies have been found, but Wallace, writing on the “Antiquity of the Genera of Insects” states that two butterflies were found in an Upper Cretaceous formation—a deposit of later Secondary date—both recognised as *Satyridæ* and one of them belonging to an existing genus; whilst in an older Secondary formation, the Lower Oolite, a wing of a butterfly has been discovered allied to the S. American Fam. *Brassolidæ*. But the great generic antiquity of butterflies is proved by the evidence of the two former fossils.

Athyma perius, Linn.

A common and very conspicuous insect, the most abundant here of the genus. It is practically ubiquitous, but prefers open ground, gardens and waste land scattered over with bushes. Like all the *Athymæ* it flies swiftly, but usually rests on foliage rather low down. The articulations of the abdomen, boldly marked in white, distinguish this butterfly at some distance. It is fonder of flowers than the preceding insect. The sexes are alike, and the butterfly is to be seen all the year round.

Fig. 1, Pl. VI is from a ♂ taken in June.

Egg, hemispherical or bee-hive shape, granulated all over, yellow, and with short white bristly hairs. Laid singly on the underside of leaves of the foodplants, *Glochidion macrophyllum* and *G. eriocarpum*, but chiefly on the former, which has a smooth, shining, coriaceous leaf; the latter a crinkled, softly hairy leaf; both plants Nat. Ord. *Euphorbiaceæ*.†

* Except, perhaps, to deceive the sharp eyes of birds and other pupæ-destroyers, by aiding the resemblance of the pupa to a shrivelled leaf or piece of bark; probably the cause of their still being retained, as such “protected” pupæ would tend to escape their foes.

† Larva also feeds *Wendlandia paniculata*. See under *Limnitis*.

Larva, figured on Pl. 2a, Fig. 7, pupa Fig. 8. When very young the larva is dark brown and at this stage, together with the larvæ of the preceding sp. and *Limenitis*, has the same habit as the young larvæ of *Neptis*, eating away the leaf except the mid-rib, on which it rests. The young larvæ of *Athyma* and *Limenitis* are much alike in general appearance, but are easily distinguishable from those of *Neptis*. For a short time after moulting the larva of *A. perius* is chiefly yellow, but curiously mottled all over with darker colour. The pupa, as shown, has a large dorsal appendage, not quite so pronounced as in *A. nefte*, but which with other markings gives it the appearance of an old man's profile. The parts coloured blue in the figure denote silver. It is attached by the tip only, without a band.

Athyma sulphitia, Cram.

A very pretty but decidedly scarce butterfly here, generally occurring most frequently in the autumn, but Commander Walker took it in March and April. It does not appear to care much for flowers, but is sometimes seen at *Lantana*, though it is then often the overripe berries which are the attraction more than the flowers. It frequents the outskirts of woods and gardens where there is plenty of foliage, but it seems to be a wandering insect, having a strong flight, and may very easily be mistaken for *A. perius* unless closely observed. It often sits on a leaf with fully expanded wings, sometimes fanning with them. The general ferruginous colour of the underside inclines more to burnt sienna than in *A. perius*, where it is much yellower in tint.

The sexes are similar. Fig. 13, Pl. IV is from a ♂ taken in October.

Limenitis procris, Cram.

This handsome butterfly is local, but fairly numerous where it occurs, being apparently circumscribed in its range here by the fact that the foodplant of the larva is not common, and it does not appear to feed on any other plants, at least in this district. *Limenitis* has a very graceful sailing flight, but at times flies very swiftly; it is fond of selecting a special leaf or twig as a resting-place, returning there after a flight. It is a woodland butterfly, not much attached to flowers, though it may be seen at some kinds of flowering trees. At rest it generally closes its wings, but sometimes sits with them fully expanded. The sexes are similar and vary much in size, the ♀ being usually the larger, sometimes measuring $3\frac{1}{2}$ inches over the forewings.

Fig. 5, Pl. VI is from a rather small ♂ taken in June, but the insect is on the wing almost every month, though most abundant in autumn.

Egg, sub-globular, granulated, hairy or bristly, green; attached singly to the upperside of the tips of leaves of the foodplant, *Wendlandia paniculata*, D.C., a small tree not common in this district, native to India and Malaya, Nat. Ord. *Rubiaceæ*.

Larva, figured on Pl. 2a, Fig. 5, pupa Fig. 6. The larva, like those of *Athyma*, often raises the body fore and aft, resting on its prolegs on the upperside of a leaf. It has a very rough,

tuberculated appearance and harmonises beautifully with the dried and blackened tips of the leaves, the old withered flowers and the collection of excrement suspended by a tangle of silk to the leaf. This tree seems to have a large part of its leaves withered and blackened at the edges and tips, at all times of the year, and the old blackened flowers hang on the tree for months.

The pupa is attached by the tip only, without a band.

Limenitis camilla, Linn.

Seems to be very rare here, but appears to have much the same habits as the former sp., and is a woodland insect. It very closely resembles *L. sybylla*, the English "White Admiral."

Fig. 4, Pl. VI is from a ♀ taken at Hongkong in June. This butterfly seems to vary a good deal in the markings of both upper and undersides, and it is very possible there may be two distinct species here of these black-and-white *Limenitis*.

Euthalia (Adolias) phemius, Doubl. & Hewits.

Commander Walker says this butterfly was fairly common in Hongkong in 1892-3, but though I have taken it there I have not seen it round Macao, and it has been decidedly uncommon in Hongkong since 1893. It has a very rapid flight at times, at other times a sailing or floating motion and is fond of trees and foliage, settling on a leaf with open wings, generally high up. The ♂ and ♀ differ considerably in shape.

Fig. 2, Pl. IV is from a ♂ taken in June, Fig. 3 a ♀ of the same month, but it seems to occur almost throughout the year.

The larva and pupa, according to the figures in the "Cat. of Lep. Ins. in Ind. Mus." seem to closely resemble those of *E. lubentina*, and the larva probably feeds here on the same plant. Walker says the pupa is green, richly spotted with gold.

Euthalia lubentina, Cram.

I have not seen this handsome insect at Hongkong, but round Macao it is not uncommon, though apparently rather sporadic in its appearance; partly, perhaps, because the foodplant of the larva furnishes a home and sustenance to a host of insects and is a happy hunting-ground for all sorts of creatures, especially ants and spiders; being also a parasite on other vegetation it is probably subject to greater vicissitudes than other plants: affected by the ills of its host as well as by its own particular misfortunes. *E. lubentina* can fly with great velocity, but usually sails quietly up and down near the tops of trees, when the white markings of its forewings appear very distinct, seen from below. It sometimes comes to *Lantana*, but does not seem much addicted to flowers. As with the *Vanessæ* one may sometimes distinctly hear the wings click, when the insect is flying rapidly. The ♂ and ♀ are very similar and do not differ in shape, but the ♀ is usually the larger.

Fig. 1, Pl. IV is from a ♂ taken in May, but it occurs nearly every month.

The larva is figured on Pl. 2a, Fig. 3, pupa Fig. 4. It feeds on *Loranthus chinensis*, D.C., Nat. Ord. *Loranthaceæ*, a parasite on trees, especially on the Lichee and Carambola, but also on many other trees and shrubs. This particular sp. seems to be confined to China, but the genus is widely distributed in both Old and New World tropics. The larva is a most beautiful creature, the head and much of the body hidden by fern-like fronds, through which a wave or undulation continually passes from head to tail as the larva travels. It usually rests down the mid-rib of the leaf, on the upperside, the tips of the fronds pressed close to the leaf.

The pupa is attached by the tip only, without a band, and is curiously angular and flattened at the end of the abdomen, which forms a sort of roof to the pupa. It is marked with yellowish, but not gilt.

Apatura parisatis, Westwood

A common butterfly here, the ♂ and ♀ differing widely both in shape and colour. The ♂ has a rapid flight and is fond of resting with expanded wings on a leaf in the shade, thence taking short and erratic flights. It also often settles on the ground. The ♀ has not such a swift flight, but also seems fond of shade, and both sexes may often be seen at *Lantana* flowers and overripe berries. Freshly emerged from the pupa the ♂ has a slight purple flush on the upperside. I have on several occasions seen the ♀ seized by the head by the small ambush-spider mentioned before, as the insect was busy feeding at flowers or berries.

Fig. 4, Pl. IV is from a ♂ taken in November, Fig. 5 a ♀ of the same month, but it is on the wing throughout the year, frequenting wooded localities. The underside varies slightly seasonally.

Egg, globular, striated axially, yellowish; attached singly to the underside of leaves of the foodplants, *Celtis philippensis*, Blanco, Nat. Ord. *Urticææ*, common from S. E. China through Malaya to N. Australia; and *Strychnos paniculata*, Champ., Nat. Ord. *Loganiaceæ*, a shrub or small tree not known out of China. Both plants have leaves with the nervures and mid-rib much raised on the under surface, alongside which the larva generally rests. Some larvæ have the yellow dorsal stripe interrupted by black markings at intervals; others have only the thin green central line; some scarcely show this.

The larva is figured on Pl. 3a, Fig. 5, pupa Fig. 6. The pupa is attached by the tip only, without a band.

Hestina assimilis, Linn.

Not common round Macao, more numerous at Hongkong. It has a floating but rather strong flight, often high up, but is fond of flying up and down beneath large trees, sometimes settling on the trunks or even on the ground. This butterfly might be mistaken in flight for

Papilio clytia, and bears some resemblance to the "blue" *Danainæ*. *H. assimilis* is on the wing for the greater part of the year. The proboscis or tongue of this insect is broad and strongly developed, and of a bright yellow. Walker says that in the Chusan Islands, where this butterfly is common, it frequents hills and settles on rocks in the sun with wings fully extended.

Fig. 9, Pl. IV is from a ♂ taken in September; the sexes are alike, but the ♀ is usually much the larger. The ♂ specimen figured is, however, unusually small, the average here being about $3\frac{1}{2}$ inches over the forewings.

The larva is probably indistinguishable from that of the following sp., which is almost certainly a mere var. of *H. assimilis*.

Hestina mena, Moore

Less frequent than the preceding sp., but with the same habits. It often has very distinct traces of the crimson spots on the hindwings of *H. assimilis*, sometimes only a few crimson scales, and occasionally the crimson is altogether wanting, as in the specimen figured; but even then the spots are faintly indicated by a difference in the tint of the ground colour. The sexes are similar, but vary in size as in the case of *H. assimilis*.

Fig. 10, Pl. IV is from a ♀ taken in August. Walker says this butterfly was bred by Dr. Beveridge "from a smooth green slug-like larva with two branched horns on the head (not very unlike that of *Apatura iris*) which changed to a very stout green pupa."

Charaxes polyxena, Cram.

Also known as *bernardus*, Fabr. A common insect here, but only found in wooded districts, where it rests, usually with closed wings, on a leaf, generally high up; taking rapid flights over the tops of the trees and frequently returning to the same perch. It is not fond of flowers but often sips the exuding juices of trees, and is very partial to overripe fruit. Both ♂ and ♀ vary considerably in colour and marking, as shown in Pl. VII, but there are also intermediate varieties. Some of the females are very large. This butterfly is on the wing throughout the year.

Fig. 2, Pl. VII is from a ♀ taken in May; Fig. 3 a ♂ of July; Fig. 4 a ♂ of the same month. The males appear to vary even more than the females.

Egg, sub-globular, smooth, yellowish; laid singly on the upperside of leaves of the foodplant *Aceronychia laurifolia*, Bl., Nat. Ord. *Rutaceæ*, a shrub or small tree native to tropical Asia, and very common in this part of China.

Larva, figured on Pl. 2a, Fig. 16, pupa Fig. 17. The pupa is attached by the tip only, without a band. The larvæ usually rest on the upperside of the leaves, down the mid-rib, and often repose with the body raised fore and aft, supported on the prolegs only.

Charaxes athamas, Drury

Also labelled *Eulepis athamas* in the Hope Coll. at Oxford.

A common insect in wooded localities ; with scarcely any variation in either sex except in size. The sexes are practically alike, but the ♀ is usually much larger, and has the apical greenish spots in the forewing better developed than in the ♂. It has the same flight and habits as the former species. Four or five butterflies may often be seen at one time on a small overripe fruit, and it is also very fond of bamboo exudations. Sometimes the two species may be observed together on the same fruit, and they are also not seldom to be seen at putrid or other offensive matters on the ground.

Fig. 1, Pl. VII is from a ♂ taken in May, but it is to be found throughout the year.

Egg, sub-globular ; smooth, yellow ; attached singly to the underside of leaves of the foodplant, *Albizzia Milletti*, Benth., Nat. Ord. *Leguminosæ*, a straggling shrub or small tree only known from China.

Larva, figured on Pl. 2a, Fig. 15. The pupa is almost exactly like that of *C. polyxena*, and is attached by the tip only, without a band.

The larvæ rest on the upperside of the leaves and often stick several of them together in a plane, generally resting thereon when nearly fullgrown ; probably because the leaves being pinnate the stems are too much encumbered to afford a comfortable resting-place, and the leaves unsupported are too small and weak to carry a heavy larva, unless secured together with silk.

As will probably have been noticed, all *Nymphalid* pupæ are attached by the tip of the abdomen only, without any band round the middle.

The *Nymphalidæ*, (*Danainæ*, *Satyrinæ*, *Morphinæ* and *Nymphalinæ*) have the front legs very short, small and imperfect, and they are not used for walking. They seem occasionally to be employed as palpi.

GENERAL NOTES.

It has already been observed in the articles on the respective insects that *Cupha erymanthis* and *Atella phalantha*, usually very common butterflies here, are in some years almost absent, both failing together; their larvæ have the same foodplant, which is here very abundant, and appear to feed only on this particular plant. *Precis lemonias* and *P. atlites* also often become extremely scarce in some districts, their larvæ also having the same foodplant; these two butterflies are very closely allied, and when one fails the other is sure to be rare; yet no scarcity of the plants is observable; nor does there seem anything exceptional about them, such as disease, or harbouring an unusual number of creatures inimical to butterfly life. Yet the scarcity at times of otherwise common insects would appear to be due to some such cause or to climatal influences; the latter, of course, directly affecting vegetation; producing effects so minute as to be inappreciable to human senses, but perhaps sufficient to vitally affect various forms of insect life. Many other butterflies also fluctuate greatly in numbers in different years, and it would appear that when some usually common species are absent, others at most times uncommon become fairly numerous. But it is perhaps unwise to lay much stress on this curious phenomenon of alternating abundance and scarcity in a part of the country so highly-cultivated, and where the wild vegetation is so continually burnt off and otherwise destroyed.

As we have seen, some larvæ will feed but on two or three plants, some apparently only on one, and it is curious to speculate as to what originally influenced the choice of a special foodplant: for larvæ will touch none but their particular plant or plants but will rather dwindle away and die. In the majority of cases the foodplants of the larvæ have small and inconspicuous flowers, and are never frequented by the butterfly except to lay its eggs thereon. It may be that, owing to the great antiquity of the genera of butterflies, plants with gay and conspicuous or scented flowers were rare at the time when many butterfly genera were already differentiated; for according to the best authorities the colours and scents of flowers have been evolved specially to attract insects. It is generally easy to perceive when a female is about to lay, as she then wanders from plant to plant in a hesitating, uncertain manner, not heeding the flowers she ordinarily never misses feeding at. She touches the leaves and other parts with the tarsi and proboscis, until she finds her proper plant, and even then is often dissatisfied with many of the leaves, going over them several times till she finally lays on one which pleases her, and so on with the next egg. This is the case with most butterflies, though as already noted there are exceptions which lay very promiscuously; and some conclude their examination of the plants very smartly, notably *Vanessa* and *Charaxes*.

Though the various theories of "Protection" amongst animals, *i.e.*, Protective Colouration, Warning Colours, etc. are still the subject of much dispute, and far from being thoroughly worked out, yet everyone admits that protection exists more or less in one form or another, and many butterflies seem to have carried protective colouration to a very high degree. *Melanitis leda* is one of the best examples here; *Hebomoia glaucippe* and butterflies of the genus *Precis* are wonderfully inconspicuous when at rest with closed wings on stalks or leaves or on the ground; and although these insects are very brightly coloured on the upperside and spend the greater part of the day at flowers, with widely-expanded or fanning wings, yet in this case they are wide awake and on the alert and seldom stay long in one position; whereas when resting with closed wings they seem to be often in a half-drowsy condition, and will remain motionless for long periods.

I think that in this part of the country Dragonflies, though exceedingly numerous, seldom destroy butterflies; but lately observed a very large and rather scarce Dragonfly catch two *Danaïs chrysippus*, which it ate on the ground. There was a great number of these butterflies at a patch of flowers, and the day was cold, which seemed to affect the flight of the butterflies but not that of the Dragonfly; for the former made scarcely any attempt to escape, flying very slowly and lazily. Probably, too, the nectar of the flowers had an inebriating effect on the butterflies. Dragonflies often make a dart at a butterfly, which the latter appears to avoid easily, though occasionally one may see a small *Lycænid* snapped up as it slowly meanders over the ground. It will often be missed at the first attempt and promptly drop into the grass, where it clings with closed wings to a stalk, whilst the Dragonfly waits on a perch hard by, apparently unable to see the butterfly or only accustomed to seize its prey on the wing; when the *Lycænid* again takes flight it is usually pounced upon and carried off.

Nearly all the plants fed on by *Danaïs* and *Euplœa* larvæ have the seeds attached to a silky floss which, carried far and wide by the wind, accounts for their wide distribution, and therefore in great measure for that of the butterflies. It is interesting to watch the large woody seed-vessels or "follicles" of *Strophanthus divergens* opening, as they quickly do under the influence of a hot sun after rain; the long silky hairs dropping in bundles as the seed-pod splits wider and wider, or carried far away by the slightest breath of wind.

Curiously enough I have never found the larvæ of *Euplœa midamus* feed on any plant but *Strophanthus divergens*, though the larvæ of *E. amymone* feed on such a variety, all belonging, however, to two Nat. Orders, *Apocynaceæ* and *Asclepiadeæ*; another shrub that should have been mentioned as one of its occasional foodplants is *Thevetia nerifolia*, Juss., Nat. Ord. *Apocynaceæ*, a native of tropical America, but much cultivated here in gardens. It seems quite possible that the variety of foodplants of the larvæ of this butterfly has some effect in producing or accentuating the numerous variations in the butterfly itself, though of course the greatest factor in variation must be the abundance of the insect, since the commoner the species the greater the liability to vary; especially when it is also of wide range, and therefore subjected to different conditions of soil and climate.

Euplœa larvæ often curl the tips of their tentacles in a small circle, which the larvæ of *Danaïs* never seem to do, though the front pair of tentacles are usually quite as lengthy as in *Euplœa*, and they are constantly moving these appendages.



II. FAM. ERYCINIDÆ (LEMONIIDÆ)

SUB-FAM. NEMEOBIINÆ

1. GENUS ZEMEROS

2. „ ABISARA (TAXILA)

This group of butterflies is chiefly Neotropical, with but few species in other Regions except the Oriental. It is represented here by only two genera, with one sp. each. The American species of this Fam., though also of small size, are mostly brilliantly coloured. The forelegs in this group are better developed than in the *Nymphalidæ*, but are never used for walking, at least in the two insects found here.

Zemerus flegyas, Cram.

Local, and not at all common round Macao, nor at Hongkong whilst I was there, but Walker describes it as very common in Hongkong in 1892-3, especially in April and May. I have chiefly taken it in January, February and March, but it occurs every month. It has a rather rapid but short flight, quickly settling on foliage, generally low down, and frequents wooded, shady places. The sexes are similar. It has very much the habits of *Abisara*.

Fig. 5, Pl. VII is from a ♂ taken in July; Fig. 6, a ♀ taken in February, or dry season, when it appears sometimes to develop a rather large apical yellow patch in the forewing. At the change of seasons specimens may be taken with the spots on the upperside much obscured. I have never observed this butterfly at flowers.

Abisara echerius, Stoll

A very common and almost ubiquitous little butterfly wherever there is any undergrowth, but especially haunting wooded country, where it flits from leaf to leaf of the underwood, taking little jumps and walking in a curious jerky manner along each leaf, with its wings half open; hardly ever taking a long flight, though sometimes in the evening when the light is fading it dashes about almost like a *Hesperid*. During the day it hardly does more than flit a yard or two at a time except when chasing a mate, though very active and constantly in motion. It is to be seen at any time of the year, and seems to bear cold well, for it may be found abroad on the coldest days, when most other butterflies are in hiding. *Abisara* is very rarely to be seen at flowers, but appears sometimes to suck moisture from the ground and sap from plants.

Fig. 7, Pl. VII is from a ♂ taken in February, Fig. 8 from a ♀ taken in May, but there is a good deal of variation in this butterfly. The females are generally lighter altogether in colour than the males, and have the light-coloured bands broad and distinct in the forewings. There is a marked seasonal variation, the rather large black sub-marginal spots of the hindwings becoming very faint or quite obsolete on both upper- and underside; the light-coloured transverse bands on both wings of the w.s.f. also disappearing. The butterfly also varies much in size.

Egg, globular, smooth, greenish; laid on the underside of leaves of the foodplant of the larva, *Embelia obovata*, Hemsl., a small straggling shrub known only from China, Nat. Ord. *Myrsinaceæ*, the genus being limited to tropical Asia and eastern Africa.

Larva, figured on Pl. 3a, Fig. 9, pupa Fig. 10. The pupa is attached to the underside of a leaf of the foodplant by the tip of the abdomen, with a band round the middle, very little or no "play" being allowed, the underside of the abdomen and head almost touching the leaf, the dorsal surface facing outwards.

The young larvæ eat away the under surface of the leaves in patches, not touching the thin upper skin.

Part IV.

BUTTERFLIES
OF
HONGKONG
AND
SOUTH-EAST CHINA.

J. C. KERSHAW, F.E.S., F.Z.S.

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PLATE VIII.

- 1.—HYPOLIMNAS MISIPPUS, *Linn.* ♀
- 2.—DANAIS (PARANTICA) MELANOIDES, *Moore* ♀
- 3.—ILERDA EPICLES, *Godart* ♀
- 4.—LEHERA ERYX, *Linn.* ♀
- 5.—LEHERA ERYX, *Linn.* ♂
- 6.—CURETIS DENTATA, *Moore* ♂
- 7.—TAJURIA CIPPUS, *Fabr.* ♂
- 8.—IRAOTA TIMOLEON, *Stoll* ♂
- 9.—CURETIS DENTATA, *Moore* ♀
- 10.—DEUDORIX EPIJARBAS, *Moore* ♂
- 11.—TAJURIA CIPPUS, *Fabr.* ♀
- 12.—TAJURIA JANGALA, *Horsf.* ♀
- 13.—IRAOTA MÆCÆNAS, *Fabr.* ♀
- 14.—DEUDORIX EPIJARBAS, *Moore* ♀
- 15.—SPINDASIS LOHITA, *Horsf.* ♀
- 16.—ARHOPALA *sp.* ?
- 17.—LAMPIDES CELENO, *Cram.* ♂
- 18.—RAPALA VARUNA, *Horsf.* ♀
- 19.—GERYDUS CHINENSIS, *Felder* ♂
- 20.—CATOCHRYSOPS STRABO, *Fabr.* ♂
- 21.—CATOCHRYSOPS STRABO, *Fabr.* ♀
- 22.—CHILADES LAIUS, *Cram.* ♀
- 23.—JAMIDES BOCHUS, *Cram.* ♂
- 24.—GERYDUS CHINENSIS, *Felder* ♀
- 25.—EVERES PUTLI, *Kollar* ♀
- 26.—ZIZERA MAHA, *Koll.* ♂
- 27.—MEGISBA MALAYA, *Horsf.* ♀
- 28.—ZIZERA MAHA, *Koll.* ♀
- 29.—CHILADES LAIUS, *Cram.* ♂
- 30.—LAMPIDES CELENO, *Cram.* ♀







PLATE IX.

- 1.—CATOCHRYSOPS CNEJUS, *Fabr.* ♀
- 2.—POLYOMMATUS BÆTICUS, *Linn.* ♂
- 3.—ZIZERA ARGIA, *Ménétries* ♀
- 4.—JAMIDES BOCHUS, *Cram.* ♀
- 5.—NEOPITHECOPS ZALMORA, *Butler* ♀
- 6.—CATOCHRYSOPS CNEJUS, *Fabr.* ♂
- 7.—NEOPITHECOPS ZALMORA, *Butler* ♀
- 8.—ZIZERA ARGIA, *Méné.* ♂
- 9.—TAJURIA CIPPUS, *Fabr.* ♂
- 10.—POLYOMMATUS BÆTICUS, *Linn.* ♀
- 11.—DELIAS HIERTE, *Hübner* ♀
- 12.—DELIAS AGLAIA, *Linn.* ♀
- 13.—PRIONERIS THESTYLIS, *Doubleday* ♂
- 14.—DELIAS HIERTE, *Hübner* ♂
- 15.—DELIAS AGLAIA, *Linn.* ♂
- 16.—PIERIS (CATOPHAGA) PAULINA, *Cram.* ♂
- 17.—PIERIS (CATOPHAGA) PAULINA, *Cram.* ♀
- 18.—CATOPSILIA POMONA, *Fabr.* ♂
- 19.—CATOPSILIA POMONA, *Fabr.* ♀
- 20.—CATOPSILIA POMONA, *Fabr.* ♀
- 21.—TERIAS HECABE, *Linn.* ♀



III. FAM. LYCÆNIDÆ.

1. GENUS GERYDUS (MILETUS)
2. " NEOPITHECOPS
3. " MEGISBA
4. " CHILADES
5. " ZIZERA
6. " JAMIDES
7. " LAMPIDES
8. " EVERES
9. " NACADUBA
10. " CATOCHRYSOPS
11. " POLYOMMATUS
12. " ARHOPALA
13. " IRAOTA
14. " CURETIS
15. " ILERDA
16. " PRATAPA
17. " SPINDASIS
18. " TAJURIA
19. " DEUDORIX
20. " LEHERA
21. " RAPALA

This very large Family of generally small-sized and often brilliant butterflies is universally distributed, but many of the genera are restricted in their range. *Gerydus* and *Deudorix* are common to the Eastern tropics; *Spindasis* is the Oriental equivalent of the Ethiopian genus *Aphnæus*; *Curetis* is Oriental and Australian. *Ilerda* is peculiar to the Oriental Region. *Polyommatus* is of almost world-wide range.

The forelegs of the *Lycænidae* are fairly well developed, and are used for walking. In the males the tarsus consists of but one joint, with a single claw at the tip. The pupæ in this Family are affixed by the tip of the abdomen, in most genera with a girdle round the middle, but this is absent in some species. The larvæ are usually slug-shape or limaciform, the prolegs very small and scarcely showing when the larva travels; the head is generally small and often retractile within the second segment.

Many of the *Lycænidae* are exceptionally interesting in their larval stages; and certain genera of these butterflies are so intimately associated in their early life-history with that of other creatures that they seem to be actually dependent on them for their very existence in some cases. The immature stages of a butterfly's life are so rapidly run through, especially in hot countries, that the interdependence of all organic life on the earth is strikingly brought under one's notice in the case of such *Lycænidae* life-histories. Most of the *Lycænidae* here may be found on the wing during the greater part of the year, and even the tiny butterflies of the genus *Zizera* seem to stand the cold spells of January and February better than most other insects, and may be seen abroad when other butterflies are hidden in sheltered nooks,

The eggs of this Family are usually sub-globular or hemispherical, and a feature of the eggs of certain genera is their strongly-marked reticulation or honey-combing of the surface; also the broad, blunt abdomen-tip of those pupæ which are affixed without a band or girdle round the middle.

The *Lycænidae* in very many instances exhibit striking seasonal changes, especially on the underside, and it seems probable that some which have been differentiated as species will eventually be proved to be merely wet and dry forms of the same insects. The "tails" which adorn the hindwings of some of these butterflies appear to withstand much hard wear, though one might imagine that a rough breath would destroy them; and specimens may often be taken in which these delicate appendages are in almost perfect condition, the insect as a whole being in a very tattered and delapidated state. Many *Lycænidae*, more especially the tailed groups, have a constant habit, whilst resting with closed wings on a leaf or twig, of working the hindwings up and down alternately, with a see-saw motion, the forewings being held still. The large anal lobes on the hindwings with which many of these butterflies are provided are usually held at right angles to the plane of the wings when closed.

It is very difficult to observe exactly whether the movements of the tails in the open air are voluntary or otherwise, as of course the slightest breath of wind will wave these slender organs, so having some pupæ of *Tajuria cippus*, a species with two pairs of long, slender tails and large anal lobes on the hindwings, they were put into a large stoppered glass jar. When the insects emerged they were closely observed, and they evidently moved the tails at will, the least possible vertical movement of the hindwings, one wing upwards the other downwards, causing the tail-tips to wave through a large space, by catching the base of one tail with the base of the other—the hollowing and smoothing movement of the anal lobes is also apparently caused by this action, the rubbing of the hindwings together—and the *Lycænids* of these groups, with tails and anal lobes, generally rest with closed wings. It has been remarked that the tails and usual black markings on the anal lobes together resemble a head with waving antennæ, thus inducing enemies to attack a non-vital part. It is, however, rather a fanciful resemblance; it seems more probable that the tails may tend to protect the insect by their motion, which would of itself draw attention to that part of the insect, or rather distract attention from other parts. The presence of the "tails"

in the first instance may perhaps be attributed to some similar cause as that which seems to have produced the wonderful crests, plumes, spurs, etc. of many birds, which Dr. Wallace many years ago suggested might have arisen from the overflowing vitality of creatures in a state of nature; produced by continual excitation and movement of the muscles and tissues of the parts whence these appendages spring. In like manner, perhaps, the tails of these butterflies, being either harmless or even beneficial to their possessors, have attained their present great development. These particular groups of *Lycænids*, though of exceedingly rapid and devious flight, seldom fly very long without resting on leaves and twigs, remaining quiescent for long periods, as they often do also at their favourite flowers; and at such times it may be that they are so liable to attack by birds and lizards that the tails may act beneficially by inducing enemies, as many naturalists believe, to attack a non-vital part, and thus effect the escape of the butterfly.

For the identification of most of the *Lycænida* I am indebted to Mr. H. H. Druce, F.Z.S.

Gerydus chinensis, *Felder*

The life-history of this curious little butterfly here given is practically a reprint of a paper in the Trans. Ent. Soc. of London for 1905.

The imago is peculiar, the ♂ with a very long abdomen and both sexes with broad, flattened legs: yet its earlier stages are still more interesting. The eyes of the butterfly are of a rather conspicuous green tint. It is common almost throughout the year in certain localities near Macao and Hongkong, but keeps more or less strictly to these shady and usually damp places, woods and gardens with large trees and neglected undergrowth, and although on the wing during the day is chiefly in evidence in the evening. In the daytime it haunts the shadier parts of woods, dancing up and down in the air just above the undergrowth, occasionally resting with closed wings on a leaf-tip, often returning again and again to the same perch, and usually not wandering far away. It loves a dark, shady spot, yet where the sunshine breaks through in gleams: and up and down, in and out of the light it zig-zags; sometimes sporting with a mate and wandering some distance away, but at length resuming its solitary aerial evolutions in its favourite retreat.

The ♀ lays her eggs towards evening and until night fairly sets in, on stems and leaves of plants and trees infested with aphides and overrun by a host of ants of two species (*Polyrrachis dives*, Sm., and *Dolichoderus bituberculatus*, Mayr.) both aphides and ants feeding on the juices exuding from the plant, the ants also using the aphides as ant-cows. Almost any vegetation seems liable to the attacks of these aphides, which swarm so thickly that the plant-stem or leaf is invisible and, barring very heavy rain or a typhoon, they are as a whole stationary for many days together, though slowly changing their positions individually, and going through their various transformations, fresh lots continually replacing the old. Bamboo shoots (the tall, not shrubby bamboo), which are always sticky with a slight exudation, are a sure decoy to these aphides; sometimes a yard or more of stem, two or three inches in diameter, is absolutely hidden by these disgusting insects.

The ♀ butterfly, after almost interminable flitting up and down and wandering hither and thither amongst the adjacent foliage, finally alights after two or three abortive attempts in the midst of the aphides and ants, which she thrusts aside with a brushing movement of the tip of the abdomen, immediately laying a single egg. She then generally moves slightly and remains for some time sucking up the exuding juice of the plant: both ♂ and ♀ are very fond of it, and half-a-dozen may sometimes be seen close together on one leaf or stem drinking this sap, thrusting their probosces through any interstices left by the bodies of the aphides. The ants do not appear to meddle either with butterflies or eggs, nor to interfere with the larvæ. Perhaps they are too much occupied with the aphides and sap, and in the case of the larvæ of *Gerydus* the ants are apparently not essential to their welfare, as they are to the larvæ of *Spindasis lohita*, to be subsequently mentioned; no doubt, however, the presence of the ants protects the eggs and larvæ from many enemies.

The egg is circular and flat, ringed circumferentially with two mouldings milled like the edge of a coin, and is of a pale green. In leaving the egg the larva makes a neat little round hole in the centre of the top. The egg hatches in about four days in the wet season, the issuing larva being nearly cylindrical at first, not assuming its limaciform or slug-shape till a later period. It is light yellow, with a distinct purplish dorsal line, and a few light-coloured hairs, chiefly at the head and last segment, the head being brownish. Later on the larva becomes limaciform, yellow or greenish-yellow, and banded longitudinally with purple-brown, the segments well defined, the second segment swollen and produced, so that the head can be withdrawn entirely beneath it, which is usually the case when the larva is resting.

The larvæ feed on the aphides, sometimes pressing them against the plant with head and forelegs, sometimes holding them in the forelegs quite away from the plant, the larvæ resting only on the prolegs. A few bites disposes of an aphid, and the larva then licks and cleans its legs just as a mantis does. Some aphides must have a better flavour than others, or it may be a question of "ripeness," as the larvæ pick and choose, moving their heads up and down over the backs of the aphides, apparently smelling them. As a rule the creatures make little attempt to escape till they are actually seized, when struggling is useless. The amusing part of it is that when not engaged in feeding on the aphides the larvæ rest amongst them or crawl leisurely between or over them, and the aphides do the like, the larvæ being sometimes covered with them. The eggs of the butterfly, too, are usually hidden beneath a mass of aphides: perhaps the reason the eggs have evolved their peculiar flat surface which, gummed down by the secretion of the ♀ at the time of laying, affords a broad, firm base unlikely to be dislodged by the movements of the aphides and ants. The structure of the legs of the butterfly has perhaps arisen from a necessity for raising the insect above the aphides when it settles amongst them, for it holds its legs almost vertically, thus raising its body higher than most butterflies.

When nearly full-grown the larvæ lose most of their sparse hairs and their colouring fades. Though usually very sluggish in their movements, when about to pupate they walk about restlessly at quite a rapid gait, and having at last chosen a suitable spot, spin a few threads at a little distance from the head and tail. My larvæ pupated on rough bark, some putting a band or girdle round

their middle, others neglecting this precaution, though all had the threads (apparently not connected to the pupæ) at head and tail. The abdomen-tip of the pupa ends abruptly, forming a large disc, thus securing a good hold, probably sufficient without any girdle, as is the case with some other Lycænid pupæ. They seem to be affixed with a secretion, but not in the form of actual threads. There is a small process each side of the seventh abdominal segment. The pupal stage in the wet season lasts about ten days. The larvæ appear to feed only on two species of aphid; one slate-coloured with white efflorescence; the other greenish with four dark-green patches, some of them being fringed with white, probably moulted skin. The larval stage in the wet season lasts some fifteen days. This butterfly probably has a brood almost every month, except perhaps January and February.

Gerydus chinensis has so far only been recorded from this part of Kwangtung.*

Fig. 19, Pl. VIII is from a ♂ taken in October; Fig. 24 of the same plate is the upperside of a ♀ taken in November. The ♂ is usually larger than the ♀, and the latter has the border of the hindwings slightly angulated.

The larva is figured on Pl. 4a, Fig. 15, pupa Fig. 16. The egg is figured on the collotype plate.

Neopithecops zalmora, *Butler*

Like the foregoing butterfly, common but local, frequenting woods and shady nooks, where it flits erratically, much like *Gerydus*, but with a feeble flight not far from the ground, or just over the undergrowth: distinct or hazy to the eye of the observer according as its white underside or dark brown upper surface is in view. It has a trick, like many other Lycænids, of rubbing its hindwings together when settled with wings closed. It is on the wing throughout the year. The sexes are nearly alike, but both vary in the amount of white patch on the upperside of the forewing, though the ♀ usually has more white than the ♂, the latter having sometimes merely a few white scales.

This insect occurs commonly in most of the patches of wood round the villages on the West River, at least as far as Kwei-hsien in Kwangsi, on the Nanning branch of the river.

Fig. 5, Pl. IX is from a ♀ taken in November; Fig 7 of the same plate is the upperside of a curious variety taken in January, with a large patch of white on both wings, the rest being of a much lighter brown than usual. This form only seems to occur in the dry season, and is uncommon.

Egg, hemispherical, granulated, greenish-white; laid singly into the junctures of the twigs and branches with the stem of the foodplant of the larva, *Glycosmis pentaphylla*, Correa; a shrub common to tropical Asia and Australia, Nat. Ord. *Aurantiaceæ*.

* I have since taken it at How-lik, just beyond Samshui.

Larva, bright light green, segments well defined. Head yellowish, marked with brown near the jaws. Body sparsely covered with short white stubby hairs, especially over the anus and in a lateral band over the prolegs. Underside and legs paler green. The head when the larva is resting is completely hidden by the second segment, under which it is drawn. The larvæ rest on the underside of the leaves.

Pupa, stout, smooth, bright green, slightly sprinkled with very short white hairs. Attached by the tip of the abdomen and a band round the middle.

Megisba malaya, *Horsf.*

A pretty little butterfly, not unlike *Neopithecops* at a glance, but conspicuously marked in black on the underside, and the hindwings "tailed." Its habits, too, are entirely different, for it does not affect heavy shade, though it haunts foliage, and its flight is strong and rapid. It generally rests on the upperside of leaves, frequenting wooded districts, and is not a common insect here. I found it abundant in the small woods round the temples on the big hill behind Tam-chau in Kwangsi, at the junction of the Red and Nanning branches of the West River; it there frequented the flowers of small shrubs.

Fig. 27, Pl. VIII is from a ♀ taken in August, and it seems to occur chiefly in the autumn, especially during October. The sexes are similar.

Chilades laius, *Cram.*

One of the commonest Lycænids here, occurring practically every month in more or less numbers. There is much range in size and marking and general colouring, especially in the females, and there is also a seasonal change in the underside of both sexes. The underside of both ♂ and ♀ has the spots very black and distinct in the wet form; in the dry form they become centred with yellowish-brown and the black edging indistinct or coalescing with other spots; sometimes the whole underside is pale brown, the spots very faint and edged with whitish. The females during the wet season are sometimes wholly brown on the upperside (form *varunana*, Moore) except for the marginal whitish markings in the hindwing, which are usually distinct, those in the forewing being often much obscured. This butterfly wanders over scrub and waste land, usually not very far from the ground, and flies at a rather slow or moderate speed, feeding at most of the flowers it comes across. It is also common in gardens and in fact occurs everywhere. It is fond of settling on foliage, where it very often rests with open wings.

Egg, hemispherical or bee-hive shape, reticulated, greenish-white; laid singly into the joints of thorns, shoots and branches of *Atalantia buxifolia*, Oliv., Nat. Ord. *Aurantiaceæ*, only known from China, a very common thorny shrub here, the foodplant of the larva. The leaves when bruised have a strong smell of orange, and the rather large berries, black when ripe, are edible.

Larva, light green, head brown. Slightly pubescent with extremely short whitish hairs, and of the slug-shape common to most Lycænid larvæ.

Pupa, the usual dumpy Lycænid form, of a general bright green, with a few small dusky markings. Attached by the tip of the abdomen, with a band round the middle.

Fig. 22, Pl. VIII is from a ♀ taken in October; Fig. 29 of the same plate from a ♂, also taken in October.

Zizera maha, Kollar

This and the following species are the two commonest Lycænids here. They are abundant throughout the year, and may be seen abroad even during cold, dull weather. *Z. maha* has an erratic and fairly quick flight, though it is continually returning in its tracks and seldom rises very far from the ground. It visits almost every flower that it finds in its meandering flight, and often rests on the ground or on grass-stalks, with closed or open wings; though to be found everywhere, it prefers open grass-land, hill slopes and waste ground, where it often swarms and where the foodplant of the larva generally grows profusely.

In the wet season both sexes are much suffused with dark brown on the upperside, the ♀ being sometimes almost entirely brown; the underside is ochreous white, with the black markings distinct.

In the dry season the blue predominates on the upperside, and the underside is dark ochreous, the spots usually very faint and ringed with whitish, but some specimens are practically uniform light brown on the underside, the spots obsolete.

This little butterfly (which appears even smaller on the wing than it really is) is subject to much variation in size, marking and colouring; the average across the forewings of a large number of specimens gave $\frac{1}{8}$ inch, and the blue of the upperside tends to purplish, whereas that of the following species inclines to silvery or whitish blue; but in many cases it is most difficult to distinguish between the two butterflies. *Z. maha* sometimes falls a prey to dragonflies, which capture it on the wing.

Fig. 26, Pl. VIII is from a ♂ taken in October or dry form; Fig. 28 of the same plate is the upperside of a ♀ taken in December; Fig. 3, Pl. Va is a remarkable variety of ♀ taken in June, with the black markings of the underside very large; but the upperside is the normal colouring of many females in the wet season.

Egg, sub-globular, whitish; laid singly on the underside of leaves of the foodplant of the larva, *Oxalis corniculata*, Linn., Nat. Ord. *Oxalidæ*, an exceedingly common little plant here, with a bright yellow flower, found in all temperate and tropical regions.

Larva, fullgrown, green, segments well defined, slightly pubescent, head included; a rather faint dorsal stripe of purple-brown, and a still fainter lateral stripe each side just above the legs, but defined by a row of rather closely-set short white hairs. Underside greenish. Head green.

Pupa, pale green, sometimes showing a faint dorsal line of purplish down the abdomen. Attached by the tip of the abdomen, with a band round the middle.

Zizera argia, *Ménétries*

Z. similis of Moore. As common as the foregoing sp.; it has, perhaps, rather a higher and steadier flight, and ranges more widely, but it is practically ubiquitous and often in company with *Z. maha* over low-growing herbage. The wet and dry forms of *Z. argia* follow much the same lines as those of *Z. maha*, the wet forms being much suffused on the upperside with brown, some of the females being entirely dark brown; whilst the underside is nearly white and the black spots very distinct.

In the dry forms the upperside of the males is often silvery blue with scarcely any brown; the blue also predominating in the females; the underside of both sexes is dark ochreous; the spots, especially in the hindwings, very indistinct and ringed with white. The average over the forewings of a large number of specimens gave $1\frac{1}{8}$ inches, but this butterfly varies much in dimensions, colouration and marking.

Fig. 3, Pl. IX is a wholly brown and rather large ♀ taken in May or wet form; Fig. 8 of the same plate the upperside of a ♂ taken in November or dry form.

I can detect no difference in egg, larva or pupa between these two species of *Zizera*, the larvæ both feeding on the same plant, *Oxalis corniculata*.

Jamides bochus, *Cram.*

Not a common insect, and it only seems to be really on the wing here in the autumn, from September to December inclusive, though individuals may be taken from May onwards. The ♂ is a most brilliant insect on the upperside, and as it has a very rapid, erratic flight, almost all that is seen of it on the wing is a glitter of metallic blue as it flashes in and out of the light. The ♀ is of a different blue on the upperside, not metallic like the ♂. Both sexes are fond of settling on foliage with closed wings, and they haunt wooded and bushy localities, flying usually at a moderate height or rather low. This Lycænid does not appear to care very much for flowers, though it is occasionally to be seen feeding at them.

On the underside both sexes are almost alike, the markings being usually very distinct, but sometimes rather faint.

Fig. 23, Pl. VIII is from a ♂ taken in November; Fig. 4, Pl. IX is the upperside of a ♀ taken in the same month.

Lampides celeno, *Cram.*

Not a very common species here, and one which occurs rather sporadically in the autumn. It is very conspicuous on the wing, and has not a very rapid flight, being generally seen meandering along grassy paths between bushes, not far from the ground; or flying over waste land or in gardens. It seems rather partial to flowers, and from its usually large size and comparatively slow flight might be mistaken at a distance for a small Pierid. The wings of this insect seem to be rather fragile and easily torn.

Fig. 17, Pl. VIII is from a ♂ taken in August; Fig. 30 of the same plate is the upperside of a ♀ taken in September. On the underside the sexes are very similar.

Everes putli, Kollar

This tiny butterfly is fairly common here, but local; sometimes very abundant where it occurs—chiefly in the neighbourhood of the foodplant of its larva. It seldom takes a long flight and keeps close to the surface of the ground, flying erratically and swiftly, going over the same ground again and again, in full view or suddenly disappearing according to the light. It is much addicted to flowers and visits all the small blossoms amongst the low herbage it usually frequents, often in company with *Zizera maha*. It seems to like the hot sunshine of an open hill-side.

The sexes are practically alike—dark brown on the upperside, and with the underside pale brown or ochreous, the spots darker and edged with whitish, so that they are very distinct. There are four or five large black spots on the outer margin of the hindwing, edged with orange or dark yellow, and with greenish-silvery scales at the lower side of the spots. Outside these black spots, one at each end of the row, are two spots formed by greenish-silvery scales. I have only taken this species from July to December inclusive. It usually feeds at flowers with open wings, and often rests for a short time with open or half-open wings.

Fig. 25, Pl. VIII is from a ♀ taken in October.

Egg, sub-globular, greenish; laid singly on the underside of leaves of the foodplant of the larva, *Indigofera hirsuta*, Linn., Nat. Ord. *Leguminosæ*, a plant common over the tropics of the Old World.

Larva, green, pubescent, with a darker green dorsal line, each side of which is an interrupted whitish line. One lateral whitish line each side just above the legs. The larvæ are of the usual limaciform type, and rest on the underside of the leaves, the green of the body being exactly concolorous with that of the plant.

Pupa, green, pale on the underside, brighter on the dorsal surface, which is sparsely covered with short whitish hairs. Attached by the tip of the abdomen, with a girdle round the middle.

Everes argiades, Pallas

Form *parrhasius*, Fabr. Not a common insect here, and occurring sporadically, but to be found in gardens, waste ground and on grassy slopes; I have, however, taken it in various localities, but never in any numbers. Walker says this butterfly is very common in the Chusan islands.

The ♀, which will be subsequently figured in black-and-white, from a specimen taken in August, is dark brown on the upperside, with two large black anal spots on the upperside of the hindwing, coloured at the top with orange; both spots are on the outside of the "tail." The underside is white, with two large orange patches on the hindwing, a black spot near the bottom of

each patch, and a few greenish-silvery scales in each black spot, towards the lower part. The rest of the markings are three black spots on the hindwing, other markings on both wings being pale brown.

The ♂ is purplish blue on the upperside, the outer margin of the forewing and costal margin of the hindwing rather broadly bordered with blackish brown; ciliæ whitish; two rather large black marginal spots on the hindwing, both on the outside of the "tail."

I have taken this Lycænid in July and August and later in the autumn.

Nacaduba atrata, *Horsf.*

A rare insect here, apparently occurring chiefly in the autumn. The ♂ will be figured later in black-and-white, from a specimen taken in October.

The ♂ on the upperside is purplish-blue, with scarcely any brown marginal border.

The ♀ on the upperside bears a superficial resemblance to the ♀ of *Famides bochus*, but the blue in the forewing is bright sky-blue, metallic and in some lights silvery or almost white. The costal margin, apex and outer margin of the forewing are broadly coloured with very dark brown, becoming wider still on the inner margin. On the hindwing the general colour is chiefly brown, with a patch of blue shining scales towards the base of the wing. The markings of the underside are seen indistinctly on the upper surface. The antennæ are barred on the underside with white, but not on the upperside.

Beneath, both sexes are almost identical, the white and brown markings being generally very distinct. There is a large black spot just outside the "tail," edged at the top with yellowish and marked at the bottom with greenish-silvery scales; there are two small black spots at the anal angle, also with yellow at the top, and marked with a few silvery scales on the black. The inner spot is the smallest.

Catochrysops strabo, *Fabr.*

A common butterfly with a rapid and erratic flight, often returning in its tracks and settling suddenly on a leaf, with half-open wings. It is often very numerous indeed in the autumn, but occurs sparingly at other times of the year except January and February, when it seems to be absent. It here frequents wooded and bushy ground, gardens and similar localities, but at Kwei-hsien it was very abundant on an extensive grassy plain. It may be seen at flowers, but prefers overripe berries. The large spider, *Epeira maculata*, seems fond of this butterfly, but he seldom refuses any Lycænids which stray into his clutches, or for that matter any other butterflies.

The ♂ and ♀ differ considerably on the upperside, as may be seen from the figures. The underside is practically the same in both sexes.

Fig. 20, Pl. VIII is from a ♂ taken in October; Fig. 21 of the same plate from a ♀, also of October.

Catochrysops cnejus, Fabr.

A fairly common butterfly, sometimes abundant, which seems to appear chiefly during the wet season. Specimens vary considerably in size, particularly in the males. It occurs in the same localities as the former species, especially in gardens, for it seems more partial to flowers than *C. strabo*. It has much the same habits as the former insect, but has perhaps not quite so rapid a flight.

The underside of both sexes is similar, but the ♂ is uniform purplish-blue on the upper-side, with a slight border of dark brown on the outer margin of the forewing, and brown on the costal margin of the hindwing—in fact as regards the upperside, it is very like the ♂ of *Polyommatus bæticus*. Sometimes the two distinct black anal spots on the upperside of the hindwing (one each side of the “tail”) are slightly coloured at the top with orange, something like the ♀, but usually the orange is obscure or altogether wanting.

The ♀ sometimes has the upperside of the hindwing nearly white, as shown in the figure, in some individuals the basal half of the wing is much suffused with brown, but the orange over the two anal spots always seems to be very distinct.

Fig. 1, Pl. IX is from a ♀ taken in October; Fig. 6 of the same plate is the underside of a ♂ taken in August.

Larva, figured on Pl. 4a, Fig. 11, pupa Fig. 12. The larvæ were taken in July, feeding on *Abrus precatorius*, Linn., Nat. Ord. *Leguminosæ*, a common twiner in the tropics of the Old World, with beautiful shiny black and scarlet seeds. It derives its specific name from the seeds being employed as rosaries or praying-beads. The larvæ feed chiefly on the flowers and seed-pods.

The pupa is attached by the tip of the abdomen, with a girdle round the middle.

Polyommatus bæticus, Linn.

Also known as *Lycæna bætica*, L., and it is sometimes placed in the genus *Lampides*. A common butterfly here in the dry season, from about October to March inclusive, but occurring sparingly at other times of the year. There is a good deal of variation in dimensions, especially in the males, some of which are very small. This insect has a rapid flight and seems fond of flowers; it chiefly frequents gardens and bushy waste ground, but occurs everywhere. The underside seems to vary very little, and is practically the same in both sexes. The ♀ varies in the amount of blue on the upperside of the forewing; sometimes there are merely a few blue scales near the base of the wing; the dark spots in the outer margin of the hindwing upperside also vary in distinctness, as do the white sub-marginal markings just above the dark spots.

Fig. 2, Pl. IX is from a ♂ taken in November; Fig. 10 of the same plate is the upperside of a ♀ taken in December. Often the dark spots on the outer margin of the hindwing upperside are wanting in the ♂, except the anal spot.

Arhopala birmana, Moore

I have taken but few specimens of this Lycænid, all in November; a ♂ will be figured later in black-and-white.

Upperside ♂, rather dark but bright purple or violet-blue, the forewing with a broad black or very dark brown outer margin, extending over the apex and along the costal margin, where it narrows. Hindwing broadly bordered on the costal margin with deep brown, which extends round the outer margin to the anal angle, gradually narrowing. The neuration of both wings is marked in deep brown.

Underside, both wings pale gray or ochreous, marbled with dark brown, most of the markings narrowly edged with whitish. Two small black spots at the anal angle of the hindwing, surrounded with a few bright blue scales.

Arhopala sp.?

This species, of a deep shining violet on the upperside, bordered with dark brown, I have been so far unable to identify, but hope to name it later. The ♂ is figured on Pl. VIII, Fig. 16. It is a rare insect here, apparently occurring chiefly in autumn, as the only three specimens seen were taken in November. It appears to frequent wooded localities, and to rest with closed or open wings on the upperside of leaves.

Iraota timoleon, Stoll

This lovely butterfly is to be seen throughout the year in more or less numbers, becoming very numerous in the autumn. It is fond of foliage, where it usually settles with closed wings, generally rather high up; occasionally it fully expands the wings when at rest on a leaf. It has a very rapid flight and is often in a very ragged condition, especially as regards the hindwings, yet even then one or more of the "tails" will often be nearly perfect. This butterfly is very fond of the exudations of bamboo and other plants, the seed-vessels of certain shrubs, and also of over-ripe fruit, where several individuals may often be seen on the same berry; I have seen half-a-dozen together on one lichee fruit, a berry not much over an inch in diameter. When disturbed at fruit they will often return very shortly, and sometimes become quite drunk with the juice. They are also rather fond of Lantana flowers, but it is chiefly the ripe berries which attract them to this shrub.

There is considerable variation in the dimensions of this insect, and it sometimes develops a small second pair of tails, like those of the following species, but not so large. The third subcostal nervule of *I. timoleon* emits two branches, the second branch being very small. The blue of the upperside of this species is brilliant and metallic.

Fig. 8, Pl. VIII is from a ♂ taken in July.

Iraota mæcænas, Fabr.

The third subcostal nervule of this species emits but one branch, yet I believe that *I. timoleon* and *mæcænas* are but seasonal forms of the same butterfly; unfortunately I have not yet bred them. The habits of *I. mæcænas* are the same as those of the foregoing insect; the blue of the upperside inclines to purple or violet.

I. timoleon in the dry season has the underside like the figure of *I. mæcænas*, the latter insect in the wet season having the underside similar to *I. timoleon*, and I think they are ♂ and ♀ of the same species. Intermediate forms as regards the underside are to be commonly met with at change of seasons, the uppersides of both insects remaining practically the same throughout the year.

Curetis dentata, Moore

Very scarce here, and I have taken but three or four specimens at Hongkong, in May and July. Commander Walker saw it there in January and December, and found it in the Chusan islands in August, and near Ningpo in November. I have taken it at Tam-chau (sometimes called Sun-chau) in Kwangsi in August.

This insect has a swift and devious flight, and the peculiar silvery whiteness of the underside makes it rather conspicuous when seen against foliage, whilst the bright orange upperside of the ♂ contrasting with the white under-surface gives it a curious appearance in flight. As will be seen from the figures, the sexes differ much in the colouring of the upperside.

This butterfly frequents well-wooded districts, and in fact seems to prefer thick forest.

Fig. 6, Pl. VIII is from a ♂ taken in July; Fig. 9 of the same plate a ♀ of May.

Ilerda epicles, Godart

This beautiful little butterfly is apparently very scarce here, and I have only taken it in this district near Hongkong, at flowers in rank undergrowth beneath large trees. I have also taken it at How-lik and Tam-chau. The ♀ seems to be more common than the opposite sex, but this is probably due to the striking colouration of the ♀, the ♂ on the upperside being dark, shining purple or violet and perhaps liable to be confused at a distance with other Lycænids.

Fig. 3, Pl. VIII is from a ♀ taken in July.

Pratapa deva, Moore

This butterfly is included on the authority of de Nicéville, to whom specimens were sent. Both ♂ and ♀ are exceedingly like the respective sexes of *Tajuria cippus*, Fabr.

Spindasis lohita, *Horsf.*

Also known formerly as *Aphnæus zebrinus*, Moore. A very pretty and fairly common little butterfly, very fond of certain flowering trees and shrubs (amongst them being *Achronychia laurifolia*, Bl.) where it rests with closed wings showing the curious markings of the underside. It is on the wing during the greater part of the year, from about March to November inclusive, and sometimes appears in dozens at the flowers of its favourite shrubs. It has an exceedingly rapid, erratic flight, and when settled is continually moving the anal lobes of the hindwings, hollowing and flattening them. Like many other Lycænids of this group it as often as not rests head downwards. It frequents the outskirts of woods, and open, bushy ground, especially where the foodplant of the larva is growing, or where its special trees are in flower.

The centre of the dark markings on the underside is silvery. The sexes are nearly alike, but the ♂ has more blue and of a brighter tint, on the upperside.

Fig. 15, Pl. VIII is from a ♀ taken in April.

Egg, hemispherical or domed, flattened on the underside, strongly processed or honeycombed on the upper surface; just laid, green, but turning dark brown within an hour. Laid singly into the joints of bracts, stems or leaves of the foodplants of the larva, or even on adjacent parts of the host-plants. The usual foodplant of the larva, is *Henslowia frutescens*, Champ., Nat. Ord. *Santalaceæ*, a very common trailing or half-climbing shrub in this district, a parasite on the roots of other vegetation. The larva also sometimes feeds on *Loranthus chinensis* (see page 53) and *Viscum orientale*, Willd., Nat. Ord. *Loranthaceæ*, a plant not much unlike the familiar British mistletoe, and of the same parasitic habit on various trees and shrubs.

Larva, fullgrown, general colour of the upperside yellowish, with a double interrupted dorsal line of dark brown. Most of the third segment is dark brown. An indistinct transverse dorsal reddish bar on each segment each side, surrounded with dark brown. Below these markings uniform greenish-yellow, the whole body irrorated with light and dark specks, the whitish ones chiefly due to extremely short hairs or stubble. The second segment is covered with a dark brown shiny chitinous shield, as is the last segment. On the twelfth segment are two dark brown chitinous tubulures, one each side, with a few hairs on the edge of the opening; from these tubulures the larva when irritated can extrude a white gland or filament which it vibrates rapidly and quickly withdraws again. The body is fringed laterally just above the legs with stiff white hairs. Legs, prolegs and underside glaucous green. Head nearly black. During the dry season the larvæ are very dark, chiefly various shades of brown, with the wet season markings very obscure. In feeding it often secures two leaves slightly together with silk, forming a shelter but not entirely hiding the larva.

Fig. 4, Pl. 5a is the posterior portion of a larva, drawn about three times the natural size, showing the tubulures, with the filament projected from one of them. The larva will be figured in black-and-white.

The larval stage is the most interesting and singular part of the life-history of this Lycænid, and judging from that it would seem to be very nearly allied to the Australian genus *Ogyris*. A very interesting paper on this genus will be found in the Trans. Ent. Soc. of London for 1905, entitled "A Monograph of the genus *Ogyris*," by George T. Bethune-Baker. Much of the information therein regarding the larval habits of *Ogyris* would apply without alteration to the larva of *Spindasis lohita*.

The first lot of larvæ I reared, bred from eggs or captured between their leaf-shelters on the foodplants (where they occasionally seem to remain all day), arrived safely at full growth, ready to pupate, when though much distended they seemed soft and flabby and burst at the lightest touch; perhaps from the lack of ants to suck away superfluous juices; they all died, as I had kept no ants with them. But later I discovered larvæ actually inside the nests of the ants, besides pupæ, and thereafter kept ants with the larvæ, which were successfully reared. They are, however, liable to a fungoid growth which kills many, especially in the dry season. Apparently only one species of ant attends on the larvæ, at least in this district; very dark red in colour, almost brown; but all three plants mentioned swarm with several kinds of ants, and are attractive to many other creatures, notably spiders. During the day the larvæ either remain between slightly affixed leaves as before observed, or more frequently in the ant-nests; especially in the latter, it would appear, during the dry season, when the larval state is long drawn out and the larvæ feed very slowly; some of these ants' nests are a fair size, but most of them very small; often made of one leaf with the edges turned up and roofed over with felted material, or two or three leaves are employed; very often a succession of small nests encircle a slender branch, especially at the junctions of twigs; or they envelop a stalk and leaf or berry of the mistletoe—each little nest containing some aphides and ants and occasionally a larva or two or three larvæ of *Spindasis*. The ant-nests are made of masticated vegetable matter, rather like the "paper" of a wasp's nest, but the material is much thicker and coarser. The ants seem to make use of almost anything, however, as my attention was drawn once by the peculiar blue tint of some nests; but an old blue rag from some coolie's raiment was hanging close by in the shrub, which had been used to construct the nests.

The larvæ issue forth from their shelters at night to feed, and are constantly attended by some of the ants, who often stand on the back of a larva, even when the latter is feeding, journeying to its feeding-ground or returning home, apparently caressing it with the antennæ, and seeming to extract some juice from between the joints of the chitinous shields and the soft parts of the body; but chiefly they excite or irritate the larva by touching the tubulures with antennæ and forelegs, till the larva puts forth the filaments from the tubes, and the ants then seem to lick up some moisture left by the filaments on the edges of the tubes. The larva can extrude the filaments either together or independently. Just before pupation the ants seem to tap the larva almost continuously, and the latter puts forth the filaments frequently and withdraws them more slowly than usual.

And thus the larvæ spend their time till they pupate, which they generally do in one of the deserted leaf-nests of the ants; or perhaps the latter kindly vacate their premises on purpose, as the nests used for pupation always seem quite new, though I have not found any ants actually

inside the nest with the pupa, except during pupation and for a short time afterwards; they may make occasional visits, however. No doubt the safety of the pupa is well assured from the fact of being concealed in what to all appearance is an inhabited ant's nest; few creatures would willingly disturb them, except woodpeckers and some few habitual feeders on ants. There is but one fairly common species of woodpecker here, and considering the abundance of large ants' nests in trees it is not probable that these birds molest the small leaf-nests in bushes and undergrowth occupied by *Spindasis* pupæ.

The pupa is dark shiny brown and yellow-brown, much like that of *Gerydus chinensis*, both in size and shape, but the tip of the abdomen, instead of being abruptly truncate, as in *Gerydus*, is blunt and rounded, and on the underside is a roughened sub-circular patch furnished with microscopic bristles, which aid the adhesion of the silk by which the pupa is affixed to one of the walls of the leaf-shelter. There is no band round the middle. The tubulures of the larva are represented by two slight scars in the pupa. Sometimes, if the larva can find a suitable leaf shrivelled into a rough tube (as the rather thick and fleshy leaves of the foodplants often are) it lines the interior with a loose-textured web of silk and constructs its own shelter.

Tajuria jangala, Horsf.

Not by any means a common insect here, and although it occurs sporadically at almost any time of the year, seems to be more numerous in the autumn. The habits of this butterfly resemble those of *Deudorix* and *Iraota*, but it is perhaps scarcely so swift in flight. It is fond of wooded localities, resting on foliage generally with closed but sometimes open wings. It does not seem particularly fond of flowers, though Commander Walker seems to have taken most of his Hongkong specimens at Poinsettia flowers, in January and December; and I have taken it at Lantana.

Fig. 12, Pl. VIII is from a ♀ taken in July; the ♂ on the upperside resembles the ♀, but the expanse of blue is much greater in both wings, and is of a deep, shining blue, whilst that of the ♀ tends to purple. Beneath, both sexes are very similar.

Tajuria cippus, Fabr.

The *longinus* of various authors. A common but rather local species, generally to be found in fair numbers where it occurs, especially in the neighbourhood of the foodplant of the larva. It frequents bushy ground and the outskirts of woods, and has a rapid flight, especially in the ♂. I have taken it every month from March to December inclusive, and it probably occurs throughout the year. The ♂ is a most brilliant insect on the upperside, a bright cobalt blue, but the extent of this metallic blue varies individually, though there seems to be scarcely any variation of the underside. This butterfly is fond of the flowers of some special trees and shrubs, but does not generally frequent garden flowers or Lantana.

Fig. 7, Pl. VIII is from a ♂ taken in August; Fig. 11 of the same plate from a ♀ of October; Fig. 9, Pl. IX the upperside of a ♂ taken in August, with a broader black margin

on the hindwing than usual, but there is much variation in the extent of black on the upperside of the males, and its configuration on the forewing; in some individuals the apical black patch of the forewing is carried almost straight across to the hinder angle of the wing—in others it is much indented. *T. cippus*, however, does not appear to vary seasonally.

Egg, hemispherical, slightly honeycombed or reticulated; yellowish-white; attached singly to bracts, stems and sometimes leaves of the foodplant of the larva, *Loranthus chinensis*.

* Larva, figured on Pl. 4a, Fig. 13, pupa Fig. 14. The larva possesses a tubulure on each side of the penultimate segment, something like those of *Spindasis lohita*, but very small; the glands or filaments capable of being brought level with the openings of the tubulures, but not extruded. However, I do not think these larvæ are attended by ants, as large numbers of the butterfly were successfully reared from the egg, without being associated with ants; although in a wild state, as the *Loranthus* is usually full of them, it is possible that they do sometimes suck these larvæ. These curious organs appear to be in an incipient state in the larvæ of *Tajuria cippus*. The head of the larva is completely retractile within the swollen second segment; and when the larva is feeding on the edge of a leaf, the broad, produced sides of the larva grip the two sides of the leaf to a certain extent, and quite conceal the prolegs and legs.

The pupa is attached to stems and twigs by the tip of the abdomen only, which is broad and slightly hollowed to fit a round surface.

Deudorix epijarbas, Moore

A fairly common and a beautiful insect, but it seems much more numerous at Hongkong than in the Macao district. It is very rapid in flight and haunts wooded, shrubby places, settling on leaves with closed wings and often remaining a long time in one position. I have taken this butterfly at Kwei-hsien in Kwangsi. It is on the wing almost every month, but is most numerous in autumn, and in common with other insects of this group is fond of flying about the tops of trees and shrubs, resting now and then on the leaves, and frequenting the same flowers which attract all the butterflies of this section of the Lycænids. Sometimes it may be seen at Lantana.

Both sexes vary much in size, but there seems to be little seasonal variation, and the underside of both sexes is very similar; the colouring of the upperside of the ♀ differs entirely from the ♂, and the hindwing of the former is less angular in outline.

Fig. 10, Pl. VIII is from a ♂ taken in March; Fig. 14 of the same plate from a ♀ of July.

Lehera eryx, Linn.

Not a very numerous species here; chiefly occurring in well wooded localities and gardens; in the latter because the foodplant of the larva is frequently growing there, and it seems to be commoner in Hongkong than Macao for this reason. When newly emerged from the pupa the underside of both sexes is a rather bright green. This insect has the same habits as *Deudorix*, etc., and the flight of the ♂ is rapid, both sexes haunting foliage and attracted by the flowering

* The larva of *Tajuria cippus* is sometimes destroyed by a species of Thread-worm of great length, which lives in the body of the larva till the latter is about fullgrown. The larva shows little sign of anything wrong with it until immediately before its death.

shrubs and trees frequented by all this group of Lycænids. I have taken it from March to September inclusive. The females are often very large in comparison with the males, and they vary somewhat in the amount of white near the anal angle of the hindwing, on the upperside.

Fig. 4, Pl. VIII is from a ♀ taken in September; Fig. 5 of the same plate a ♂ taken in May. The blue on the upperside of the ♂ is very bright.

Larva, somewhat limaciform but more cylindrical than most Lycænid larvæ; of a general brownish-yellow, with a large head, reminding one rather of many coleopterous larvæ; skin smooth and rather shiny. It feeds on *Gardenia florida*, Linn., Nat. Ord. *Rubiaceæ*; the double or cultivated variety, though the single-flowered shrub is indigenous to China and grows here abundantly, and the larva may probably feed on it; although it could scarcely conceal itself very well in the buds of single flowers. The larvæ feed on the unopened flower-buds, boring holes through them and eating away the interior. The shrub is called by the Portuguese here "Flor de Maio" or May-flower, as it is in full bloom in that month.

The pupa is short and stout and of a general rather dark, shiny yellow. Sometimes it is affixed to the centre of a leaf, sometimes to the interior of a bud which has been eaten away by the larva. The clean-cut circular holes bored by the larvæ may often be observed in the flower-buds of this shrub or tree. The pupa is attached sometimes with, sometimes without a girdle.

Rapala varuna, Horsf.

A common Lycænid, occurring nearly every month, but often very numerous in the autumn. It does not seem to vary much seasonally, but the bluish-silvery markings on the underside of the hindwing at the anal angle are sometimes very distinct and sometimes almost wanting; and the two large black spots, one on the anal lobe and one just outside the "tail" bordered at the top with orange, in some individuals are very large and black, in others rather small and obscure.

In certain lights the ♂ has most of the hindwing and a patch on the lower part of the forewing of a deep, shining and brilliant blue, but looked at directly from above it appears of a very dark indigo blue, almost black. The ♀ is rather lighter on the upperside, inclining to purple, and is not brilliant in any light.

This insect has a rapid flight and the usual habits of *Deudorix*, etc., and is exceedingly fond of the flowering shrubs already referred to. If disturbed whilst feeding it will dart away but often settle on a leaf hard by, and return to the flowers in a minute or two. It may sometimes be seen feeding at the juice of Lantana berries and other fruits.

Fig. 18, Pl. VIII is from a ♂ taken in May, but as stated above the sexes are much alike, especially on the underside.



GENERAL NOTES.

The leaves of vegetation, especially in the tropics and where it is subjected to much cutting and lopping, seem to vary greatly in form and habit in the same species ; locality and many other influences tending to alter the character of a plant. Often the very same branch will bear full-sized leaves of three or four entirely different characters : some simple, others lobed ; in some the edges serrated or crenulated, in others entire. Some individuals seem always to produce small leaves, whereas others have them so large as to render it difficult to recognise the same plant. Often it is anything but easy for the breeder of larvæ to match a foodplant with certainty in the absence of the flower, yet however alike the plants may be the larvæ will refuse anything but their proper food. Nor does the butterfly seem much perplexed in distinguishing the special plant on which to lay her eggs, though she examines it well, apparently by touch, possibly scent also or both.

The ♂ of most butterflies when courting the ♀ hovers a little above and slightly behind her, rising and falling alternately, the ♀ meanwhile sitting on a leaf or twig, usually with open wings laid flat on the leaf ; after some time the ♀ often flies to another resting-place, pursued by the ♂, and these tactics are frequently repeated. Sometimes, perhaps when the ♀ wishes to avoid the ♂, the two fly up into the air, mounting higher and higher, the ♂ indulging in aerial evolutions about the ♀, who generally flies steadily.

Eggs are apparently laid the next day after coition, which seems to last several hours ; some butterflies appear to lay a few eggs one day, a few the next and so on till all are deposited ; but those which lay their eggs in batches perhaps lay them all in one day. Those which lay on the underside of a leaf generally rest on the upperside and curve the abdomen beneath. Eggs blacken just before the larva eats its way through the shell, or the dark head of the larva can be discerned through the top of the egg. Usually eggs hatch very early in the morning. The head in newly-hatched larvæ is very large in proportion to the body.

During its lifetime a larva undergoes from four to seven moults or changes of skin as it grows too large for its old envelope ; the old skin splitting along the back of the anterior segments and the larva gradually withdrawing its body from the abdominal portion of the skin : a series of undulations keep on passing through the body from tail to head. A certain liquid or secretion seems to aid this operation by gumming the anal portion of the old skin to the surface of the leaf or twig on which the larva is moulting. For a day or two before moulting the larva loses its bright colouring, shortens, thickens and becomes wrinkled, and has sudden contractile and lengthening movements, also ceasing to feed. After a moult the new skin is very fresh and bright, and often for several hours coloured and marked quite differently to its normal appearance, but this it resumes shortly.

For some time before actual pupation the larva loses its bright colouring entirely, and again becomes shorter and thicker, ceases to feed and rids itself of all excremental matter in the body. It is usually exceedingly restless and travels up and down till it finally decides on a spot suitable for its transformation. In the case of a *Nymphalid* larva a button of silk is spun on the

leaf or stem and the anal portion of the last segment is attached to this cushion. Just at actual pupation the larva, which has been hanging for one or two days by the tip of the abdomen, with the head and anterior segments bent upwards in a sharp curve, unrolls itself till it hangs almost perpendicularly, and begins a series of lengthening and shortening or retractile movements; the larval skin splits down the back of the anterior segments, and the pupa begins twisting in all directions with a screwing motion, gradually working the skin up towards the tip of the abdomen, as a tight-fitting glove-finger is pushed off. The pupa has now a most difficult feat to perform—to suspend itself by the “cremaster” (the plate or flap above the anus of the larva, modified in the pupa for this special purpose) and at the same time to rid itself of the larval skin, which also covers the cremaster. Réamur, more than a hundred and fifty years ago, discovered how this task was effected—briefly, the larval skin, which hangs from the button of silk, is gripped between the posterior articulations of the pupa and by certain hooked processes at the tip of the pupal abdomen; whilst the pupa is thus temporarily held by the old larval skin, the “cremaster” is cleared from it and securely hooked into the silk button by screwing motions of the tip of the abdomen. The discarded skin sometimes remains attached to the silk, but the movements of the pupa usually jerk it to the ground. The pupa then adjusts itself to its normal position, but afterwards again twists, expands and contracts the segments; again it rests awhile and anon repeats the same manœuvres, finally remaining quiescent at its natural angle. All this, from the time the larva unrolls and begins its retractile movements, is accomplished in about five minutes. Larval spines usually appear in the pupa as dorsal processes.

Shortly before the butterfly emerges the pupa either turns nearly black, or the colours of the wings show through the pupal envelope. The latter splits down the back of the head and thorax, and the insect releasing its forelegs gradually works out and frees the abdomen from the shell, the abdominal part of which does not split; the parts which come unsoldered, so to speak, are the wing-cases, whilst the thorax splits dorsally. Having got rid of its encumbrance, the butterfly generally sits on the wreck of the pupa and slowly sways from side to side, shaking out the folds of the wings. Within a quarter of an hour these organs are fully expanded, and the insect forces out a few drops of reddish or ochreous fluid from the abdomen (probably the waste products of the pupal stage) and is ready for its first flight. At this time the two portions forming the proboscis are separated along their entire length, but the butterfly soon adjusts them together. I believe, however, that the parts are not infrequently separated in after life, probably to clear away some slight obstruction which has choked the passage.

Butterflies generally emerge from the pupa early in the morning, nearly always before noon.

The number of eggs laid by a butterfly probably varies somewhat individually; from females of *Vanessa indica* I have taken at different times upwards of 90 eggs, about 70 of which seemed almost ready to lay. This would seem to be the usual number laid by this species at one time; whether a ♀ lays more than once in the season I do not know.

Eggs are occasionally laid by bred butterflies which have been kept separated from males. These eggs are infertile and are generally white or colourless. There are, however, certain species of moths of the Families *Psychidæ* and *Tineidæ* which are parthenogenetic, *i.e.* lay fertile eggs without intercourse with males.

Perhaps one reason why so many larvæ of butterflies (especially when young) invariably feed on the underside is because the lower substance of leaves is usually softer and more succulent than the upper skin. The larvæ would scarcely be concealed any better on the under-surface than on the upperside, as birds, lizards, etc. can examine one side as easily as the other.

Amongst the flowering shrubs and trees so much frequented by the *Lycaenidæ* and many other butterflies and insects are species of *Evodia*, *Achronychia* and *Eugenia*, all with small but thickly-clustered yellowish-white flowers. *Eugenia operculata*, however, has large tasselled flowers, much frequented by *Delias* and a few other butterflies. But the flowers which attract the majority of the butterflies here are those of *Lantana camara*, L., Nat. Ord. *Verbenacæ*; not an indigenous shrub here, but originally a native of S. America, now widely diffused along the south coast of China, though it does not yet appear to have established itself very far inland. It is quite a recent importation, having probably arrived within the last fifty or sixty years. It is not the foodplant of any butterfly larva so far as I am aware, though the larvæ of a few moths feed on it. This very pretty though somewhat straggling shrub has spread rapidly through the warmer countries of the globe, probably chiefly through the agency of birds, many of which are very fond of the berries, especially Bulbuls and White-eyes. In some of the Pacific islands *Lantana* has spread till it has become a curse, but it is not likely to overrun South China for, like every other woody plant, it is sought after by the ubiquitous fuel-gatherers. It is more or less in flower and fruit together throughout the year, and furnishes food and shelter to a host of birds, insects and reptiles—chiefly lizards and small snakes.

Although the Violet is scarce round Hongkong and Macao, a scentless species is very common both on the hills and in the valleys and plains of the West River, from Canton to Wuchow, especially near Kum-chuk, Sam-shui, How-lik and other places, and in consequence *Argynnis hyperbius* is common in these districts; it is also fond of haunting the barren summits of the highest hills here. *Smilax China* also grows profusely in the above-mentioned localities, and *Vanessa canace* is correspondingly abundant there. *Lantana* has apparently not yet spread so far inland, or at least is scarce beyond Canton. How-lik, about eighteen miles above Sam-shui, and Lo-fu-shan, some sixty miles east of Canton and seventy north of Hongkong, are two small but beautifully wooded and watered areas, where the vegetation has been protected by the large Buddhist monasteries located in both places; some of the trees are of great height and girth, and How-lik forms a sanctuary for a bright-plumaged Barbet (*Megalæma*) and a charming little squirrel with brown fur, striped down the back with fawn and black. Neither Barbet nor squirrel seems to stray from this patch of forest. The wooded hills here are probably not over two thousand feet in height, though the barren hill at the back, whence the stream descends, is just over three thousand; but two

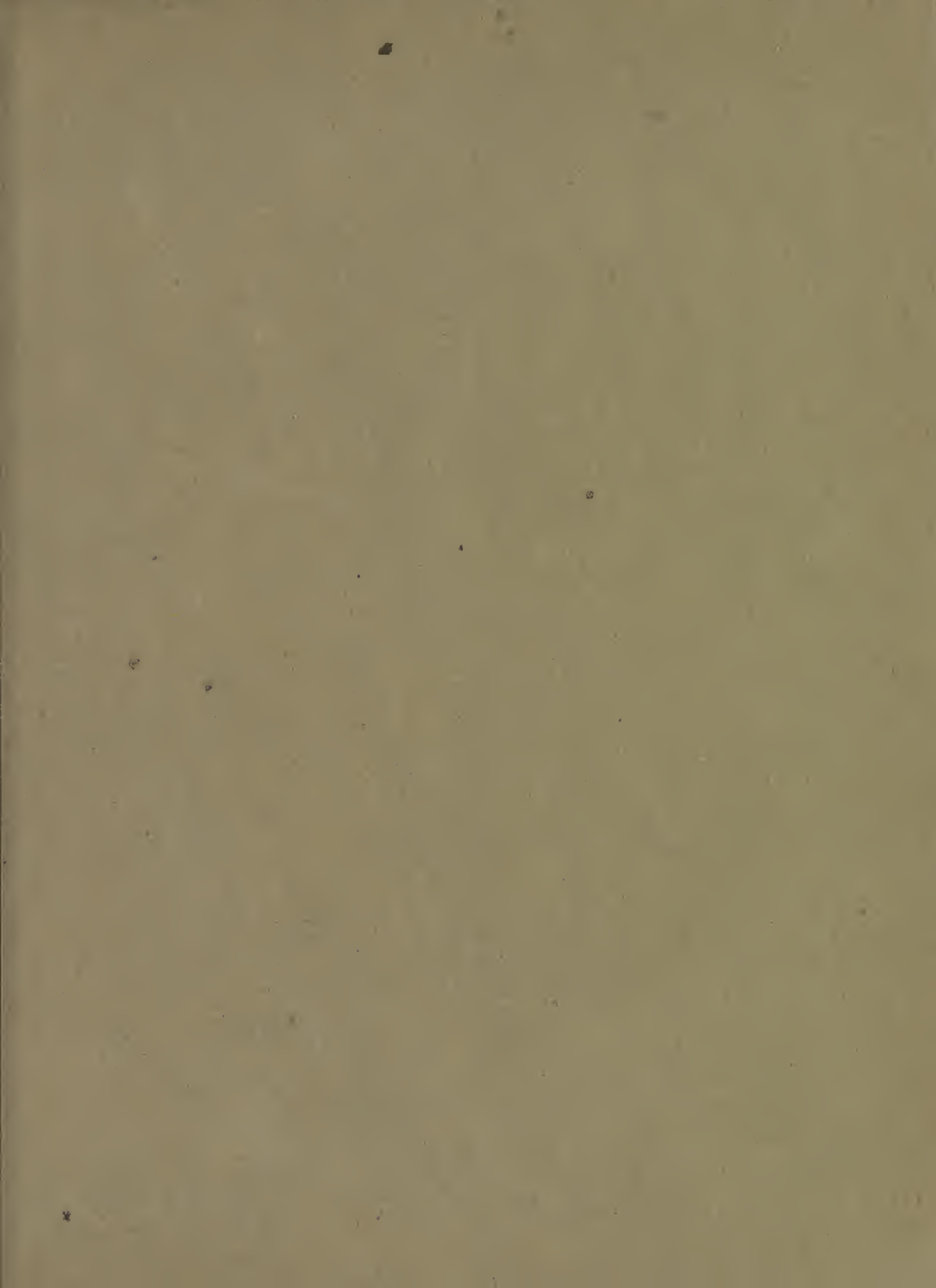
or three summits at Lo-fu-shan rise to near four thousand; both places are haunted by many butterflies, especially in spring and autumn. Doubtless many plants which have been exterminated in the surrounding country here find a refuge, and with them a number of butterflies whose larvæ feed thereon. For a very pleasant trip to How-lik during February in H.M.S. *Robin* I was indebted to Lieut.-Commander Robert E. Vaughan, R.N., who has collected several interesting birds there, and is making valuable notes and collections of the nesting-habits and eggs of the birds of Kwangtung.

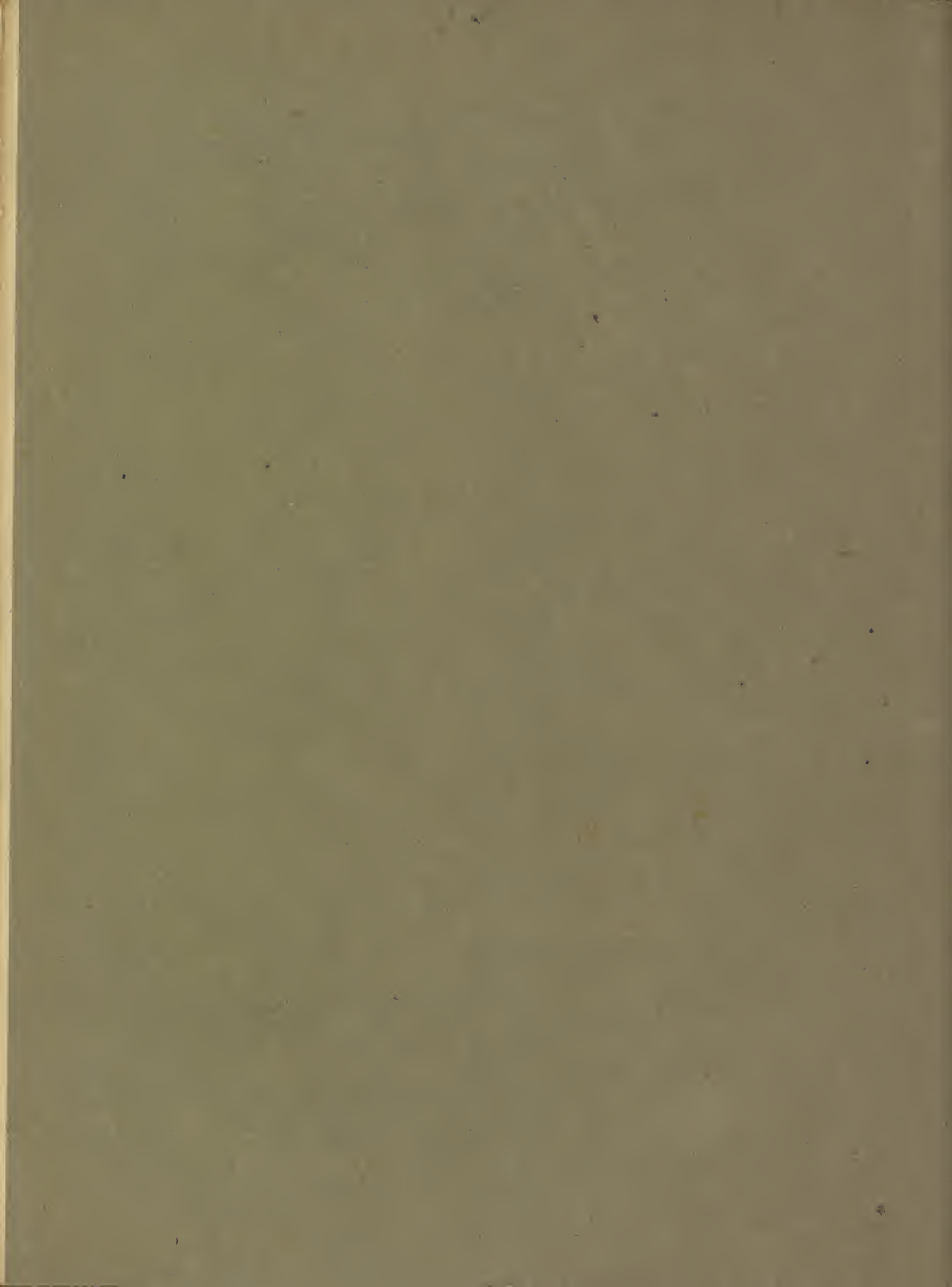
Butterflies of all kinds, particularly during the dry season, may often be seen on the ground amongst grass, searching for moisture to slake their thirst. Sometimes a butterfly is caught and held for a moment or two by the flowers of some special plants, such as *Asclepias*, and is seen struggling to disengage its proboscis; or in probing *Lantana* blossoms the insect will sometimes carry away a bit of flower clinging to the proboscis; fragments of flower may often be seen dropping from the *Euplœina* as the butterflies leave this shrub.

The habits of many butterflies change according as the same species inhabits two or more entirely different districts: one perhaps well wooded and mostly level plain; another chiefly barren hills; yet another marsh or fen. And the different conditions of existence in such varied and perhaps widely-separated districts would tend to differentiate more and more the butterfly inhabiting them all. Thus it is that the description of the habits of a butterfly in one locality may not altogether apply to the same insect in another place. Commander Walker found that in the Chusan islands *Hestina assimilis* frequented bare hill-tops, settling on the rocks in the sun. In this district it haunts wooded places at about sea-level, often settling on tree-trunks and branches, especially where sap is exuding, which they eagerly drink.

A great deal of investigation and research has of late years been directed towards the solving of the problem of "Seasonal Dimorphism" of certain butterflies or the case where a particular species produces two different generations, differing not only in colour and marking but even in the form or outline of the wings; as for instance *Precis almana*. In the breeding of some butterflies it is possible under certain conditions to produce imagines of the opposite form to that which should have occurred under natural conditions. Light and moisture, cold and heat, seem to have a great influence on the organisation of a butterfly during its larval and pupal stages (probably also in the egg), but the exact causes or conditions which produce dimorphism are not yet accurately known.





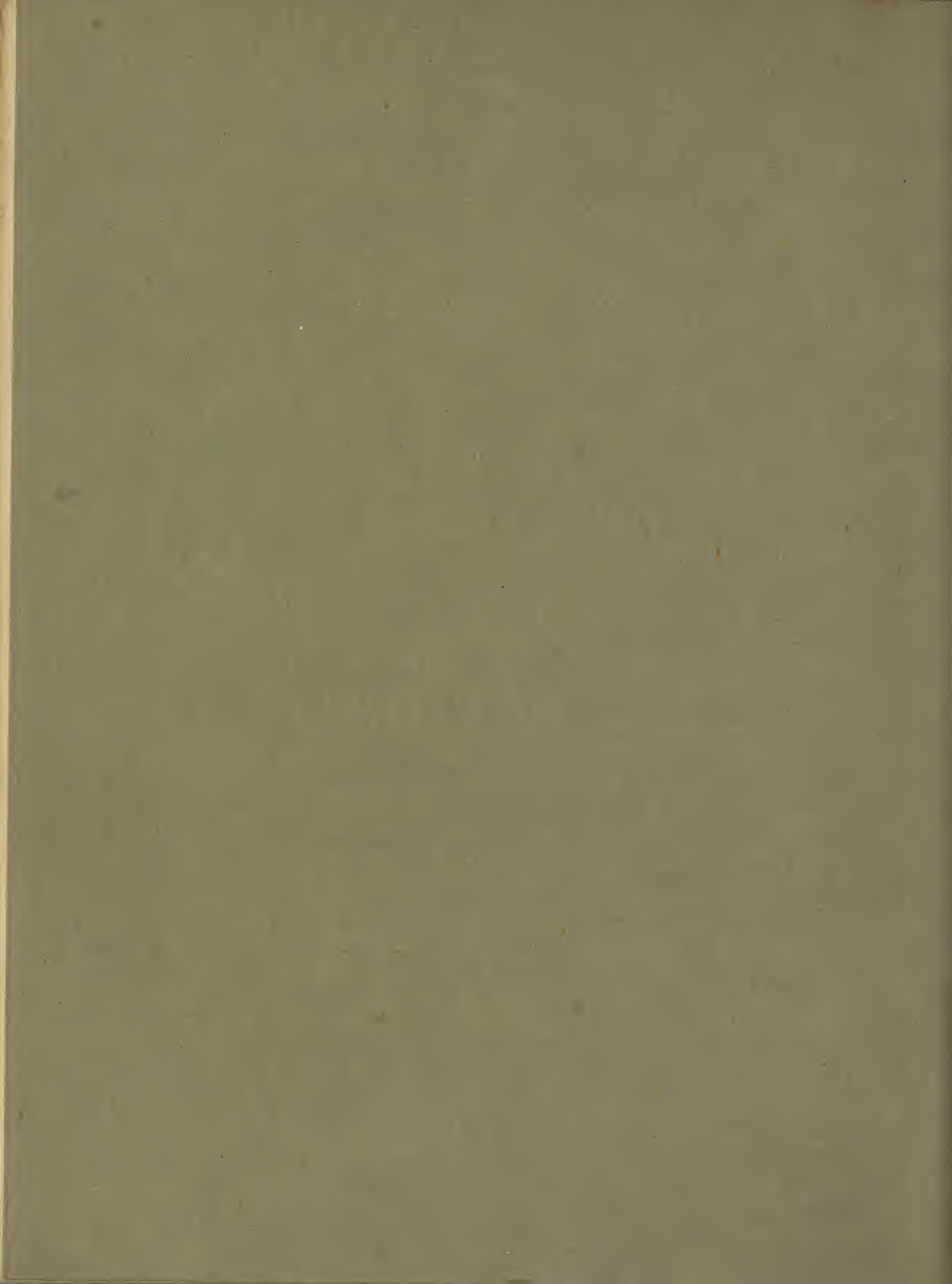


Part V.

BUTTERFLIES
OF
HONGKONG
AND
SOUTH-EAST CHINA.

J. C. KERSHAW, F.E.S., F.Z.S.

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HENTSCHEL, COLOURTYPE.

PLATE X.

- 1.—PAPILIO XUTHUS, *Linn.* ♀
- 2.—HEBOMOIA GLAUCIPPE, *Linn.* ♀
- 3.—TERIAS LIBYTHERA, *Fabr.* ♂
- 4.—LEPTOCIRCUS CURIUS, *Fabr.* ♀
- 5.—PAPILIO MEMNON, f. PHOENIX, *Dist.* ♀
- 6.—PAPILIO MEMNON, f. AGENOR, *Linn.* ♀
- 7.—PAPILIO PROTENOR, *Cram.* ♀
- 8.—PAPILIO PROTENOR, *Cram.* ♂
- 9.—PAPILIO MEMNON, *Linn.* ♂
- 10.—IXIAS PYRENE, *Linn.* ♀







PLATE XI.

1. PAPILIO CLYTIA, *Linn.* ♂
2. PAPILIO CLYTIA, *Linn.* ♀
3. PAPILIO CLYTIA, *Linn.* ♀
4. PIERIS NERISSA, *Fabr.* ♀
5. CATOPSILIA PYRANTHE, *Linn.* ♂
6. HEBOMOIA GLAUCIPPE, *Linn.* ♂
7. PAPILIO ANTIPHATES, *Cram.* ♀
8. PIERIS CANIDIA, *Sparrm.* ♂
9. IXIAS PYRENE, *Linn.* ♂
10. PIERIS NERISSA, *Fabr.* ♂







PLATE XII.

1. PAPILIO PARIS, *Linn.* ♂
2. PAPILIO BIANOR, *Cram.* ♂
3. PAPILIO HELENUS, *Linn.* ♂
4. PAPILIO POLYTES, *Linn.* ♀
5. PAPILIO POLYTES, *Linn.* ♀
6. PAPILIO ARISTOLOCHIAE, *Cram.* ♀
7. TERIAS HECABE, *Linn.* ♀
8. TERIAS HECABE, *Linn.* ♂

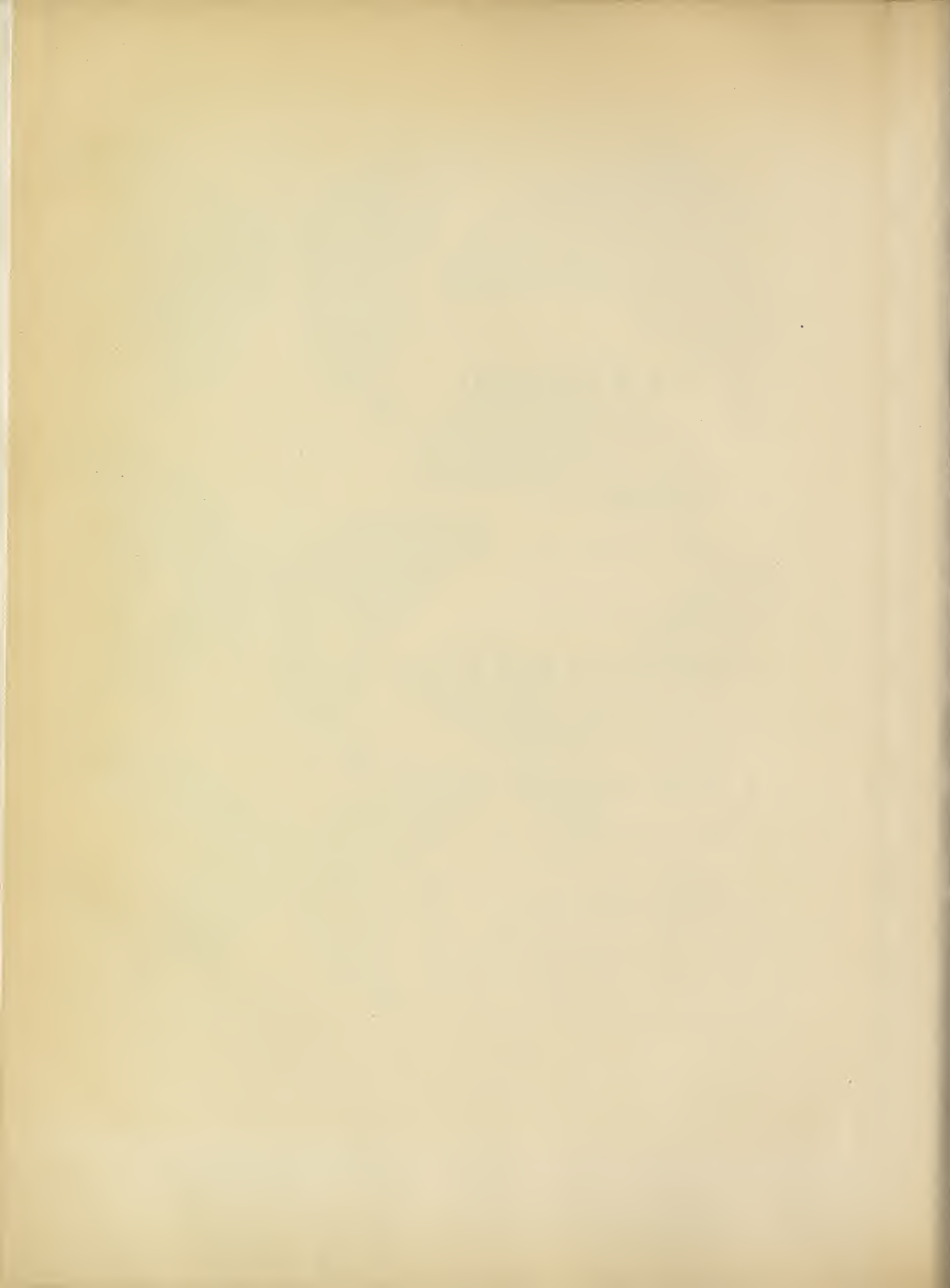
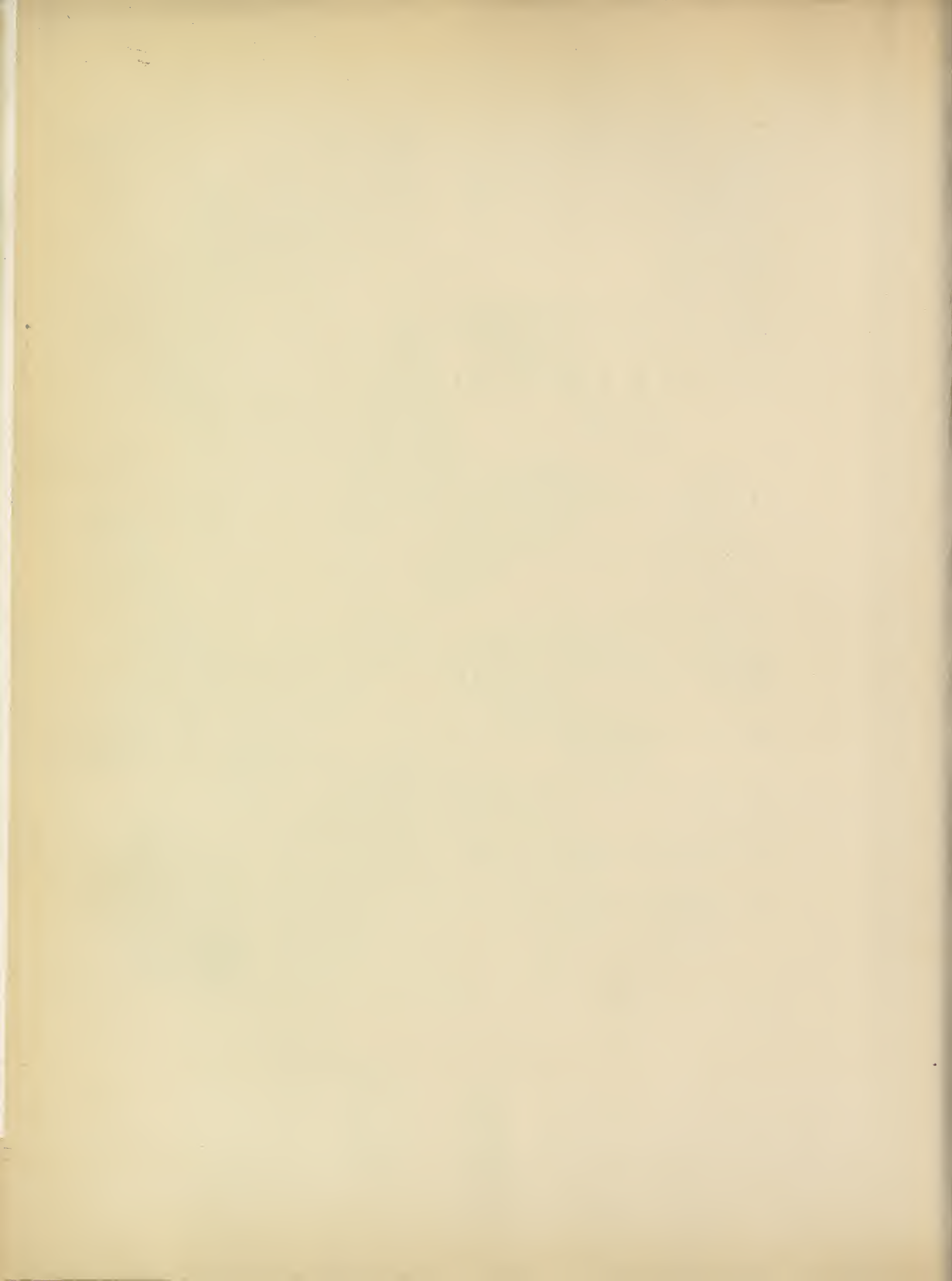






PLATE XIII.

1. DERCAS VERHUELLI, *Van der Hoeven* ♂
2. DERCAS VERHUELLI, *Van der Hoeven* ♀
3. PIERIS NERISSA, *Fabr.* ♂
4. PAPILIO EURYPILUS, *Linn.* ♀
5. PAPILIO SARPEDON, *Linn.* ♂
6. PAPILIO AGAMEMNON, *Linn.* ♀
7. PAPILIO DEMOLEUS, *Cram.* ♀
8. PADEMMA CRASSA, *Butler.* ♂



IV FAM. PIERIDÆ.

SUB-FAM. PIERINÆ.

1. GENUS DELIAS.
2. „ PRIONERIS.
3. „ TERIAS.
4. „ IXIAS.
5. „ HEBOMOIA.
6. „ CATOPSILIA (CALLIDRYAS).
7. „ DERCAS.
8. „ PIERIS (GANORIS, HUPHINA, CATOPHAGA).

Delias and *Hebomoia* are Oriental and Australian genera. *Terias* and *Catopsilia* are represented everywhere in the tropics; *Ixias* is Ethiopian, Oriental and Australian. *Dercas* and *Prioneris* are peculiar to the Oriental Region. *Pieris* is a universally distributed genus, but many of the sub-genera into which it is divided are restricted in their range. As, however, but few species are here dealt with, they are all included in *Pieris*, but the sub-genera are given in brackets. The larvæ of many butterflies of this Family are gregarious, and nearly always rest on the upperside of leaves. The pupæ are suspended by the tip of the abdomen, with a girdle round the middle. The forelegs are perfect in this Family, and are used for walking.

Delias hierte, Hübner

This pretty insect is sometimes very abundant round Macao, frequenting wooded country; near Hongkong it seems to be scarce, and in the whole district it appears to be rather sporadic from some obscure cause, for the foodplant of the larva is everywhere plentiful; the larvæ, however, as will be noted later, are very subject to the attacks of Ichneumon flies, and this may account to some extent for the periodic scarcity of the butterfly. Though most numerous in spring and autumn this insect is on the wing throughout the year; it generally flies rather slowly and feebly, with the hindwings much drooped, often high up about the tops of trees, and is very fond of flowers, especially those of certain trees, where it sometimes gathers in swarms: several butterflies feeding at the same time on one flower. It is also much attached to the flowers of Lantana. Usually it rests with closed wings, showing the brilliant colouring of the underside. Sometimes the long-shaped apical spots on the underside of the forewing are very yellow, sometimes nearly white.

Fig. 14, Pl. IX is from a ♂ taken in January; Fig. 11 of the same plate the upperside of a ♀ of November: the underside resembles that of the ♂. The ♂ does not appear to vary much seasonally, but the ♀ in the wet form often has the dark brown of the upperside covering a greater

extent than in the dry form, and also darker and much suffused. The ♂ in dry form has the neuration of the forewing less broadly marked in black than the wet form, as a rule. The wet forms are usually the larger.

The larva is figured on Pl. 3a, Fig. 13, pupa Fig. 14. The larvæ are gregarious, feeding on *Ficus retusa*, Linn., a tree which is often to be seen in front of temples and which grows to a large size, often sending forth aerial roots: one of the many trees commonly known as banyans. When about to pupate the larvæ, which generally feed in the upper parts of the tree, let themselves down by a thread of silk, just as many moth larvæ do; often a dozen or more may be seen descending thus to the ground, usually in the evening. On reaching the ground they disperse in all directions to surrounding shrubs where they pupate. They perhaps descend for this purpose because the tops of these trees are much exposed to the violent storms of the wet season, which would destroy many pupæ, though probably not affecting larvæ to the same extent.

Delias aglaia, Linn.

Also known as *D. pasilhoë*, Linn., but the above name has priority. Usually a very common insect around Macao, but not so numerous at Hongkong. In the former district it often occurs in crowds in wooded localities, where it frequents the same flowers as the former species, which it also resembles in flight and habits. Both species of *Delias* seem to haunt special places for long periods, and are not such wanderers as most insects of this Family. *D. aglaia* is on the wing throughout the year in more or less abundance, and is very fond of flowers, feeding at them with wings half-closed or quite shut.

Fig. 15, Pl. IX. is from a ♂ taken in May; Fig. 12 the upperside of a ♀ of the same month. The forewings of the ♂ are much narrower and more angular than those of the ♀.

There is no very marked seasonal change in this butterfly, but the upperside of both sexes is usually rather darker and more suffused in the wet forms. The upperside of the ♀ inclines to brown, that of the ♂ to black, when freshly-emerged to bluish-black. The underside is practically the same in both sexes. The wet forms are usually the larger.

Egg, spindle-shaped, smooth, bright yellow; laid in a batch of twenty, thirty or more on the upperside of leaves of the foodplant, *Henslowia frutescens*, Champ., Nat. Ord. *Santalaceæ*, only known from China and very common in parts of this district: a parasite on the roots of other vegetation. The larvæ also feed occasionally on *Loranthus chinensis*.

Larva, figured on Pl. 3a, Fig. 11, pupa Fig. 12. Just hatched the larvæ are yellow, sparsely hairy, heads black. They are gregarious, many of them, when young, feeding side-by-side on the same leaf. They have a curious habit of resting on the prolegs on a stem, and turning the anterior part of the body at right angles, sideways off the stem. They seem to be very liable to the attacks of Ichneumon flies, a batch of 30 or more pupæ often producing nothing but ichneumons and sometimes many of the larvæ die off and pupæ shrivel up without any apparent cause. The larvæ usually disperse to pupate, but sometimes pupate gregariously, a dozen or so pupæ being affixed to one large leaf; they attach themselves at almost any angle, sometimes horizontally.

Prioneris thestylis, Doubleday

I have taken but three or four specimens of this fine insect, which has a stronger flight than *Delias* and often flies high round tree-tops; but it appears to have much the same habits as *Delias*, and seems almost as fond of the same flowers as the butterflies of that genus. A marked peculiarity of *Prioneris* is the strongly serrated costal margin of the forewing, which is toothed like a saw.

Fig. 13, Pl. IX is from a ♀ taken in May, at Macao. I have also taken it there in June.

Prioneris clemathe, Doubl.

Commander Walker took one ♀ of this species at Hongkong, in the "Happy Valley" gardens, in 1893.

Terias hecabe, Linn.

One of the commonest butterflies here: the genus is represented in all the tropical parts of the world. The individual variation of *T. hecabe* is enormous, both in size, markings and depth of colour. All these varieties occur plentifully at all times of the year, but the larger specimens are perhaps rather more numerous in the dry season and at change of seasons, especially in the spring months. Individuals with a fairly broad black border, scarcely indented, may be observed *in coitu* with others having a very broad border, deeply notched, or with scarcely any border whatever and with but a very slight apical patch, the males and females alike varying. Still, on the whole, in a long series, mated pairs will be found to incline to similar markings, though many striking exceptions will be noted. Across the forewings this butterfly varies from about $1\frac{1}{4}$ inches to nearly $2\frac{1}{2}$, some of the smallest specimens occurring in the wet season. The ♀ is usually paler in colour than the ♂, sometimes very pale, but this is by no means invariable, and though the ♂ has generally the broader black margins to the wings, the reverse is sometimes the case. The dry forms are usually heavily marked with reddish-brown on the underside of both wings, especially a sub-apical patch in the forewing; the wet forms often have scarcely any or very faint markings, but this is not a constant condition.

This pretty insect, though not exceptionally swift, has an erratic, wandering flight, very much like that of the Lycænid *Zizera otis*, and generally rambles over the country a few feet above the ground, often stopping at flowers, of which it is very fond, and appears to feed at all that come in its way, though curiously enough it does not seem to appreciate Lantana. *Terias hecabe* is one of the butterflies here which venture forth on almost the coldest days, even when dull and inclined to drizzle, provided a strong wind is not blowing.

Fig. 21, Pl. IX is from a ♀ taken in October, in cōp. with a ♂ similarly marked, but of a brighter yellow; Fig. 7, Pl. XII is from a ♀ of April, taken in cōp. with the ♂ drawn at Fig. 8 of the same plate.

Egg, spindle-shaped, smooth, white; attached singly to the upperside of leaves of the foodplants of the larva, amongst the most usual being—*Cassia Tora*, Linn.; *Leuccena glauca*,

Benth., both Nat. Ord. *Leguminosæ* and common to most tropical regions; *Breynia fruticosa*, Hook., Nat. Ord. *Euphorbiaceæ*, found in S. E. China and the Malay Archipelago; and also on young plants of *Cratoxylon polyanthum*.

The great abundance of *T. hecabe*, due partly to an evident immunity from many enemies; its wide range and adaptability of the larva to feed on many kinds of plants; its being on the wing (and probably having a brood) every month in the year, no doubt accounts in great measure for the variation in size, colour and marking of the butterfly.

Larva, figured Pl. 3a, Fig. 19, pupa Fig. 20. The lateral stripe is whiter and not bordered with darker green along the upperside, as in the larva of the following species. The hairs on the larva seem to attract moisture from the atmosphere, which condenses in a minute globule of water on the end of each hair, and gives the larva the appearance of being irrorated with white.

Terias libythea, Fabr.

Also known as *T. brigitta*, Cram. A very small *Terias*, much more constant in size and marking than the former species. It is more local than *T. hecabe* and chiefly frequents the open, grassy hillsides and waste ground where the foodplant of the larva grows. It has a rather feeble but devious flight, usually quite close to the ground, scarcely rising more than a foot or two, and is fond of the small flowers growing amongst the grass. It occurs the greater part of the year, but is especially numerous in August and the end of the wet season. The black apical patch and border of the forewing is never deeply notched, as it often is with *T. hecabe*, and the underside is very faintly marked and scarcely alters seasonally. The black on the upperside of the forewing is very fairly constant in breadth, but the black marginal border of the hindwing is usually broader in the females, but sometimes very slight and interrupted in both sexes.

Egg, spindle-shaped, greenish-yellow, laid singly on the upperside of leaves of the foodplant of the larva, *Cassia mimosoides*, Linn., Nat. Ord. *Leguminosæ*, a small prostrate wiry plant with very narrow pinnate leaves and small yellow flowers, usually growing amongst grass, and widely spread over tropical countries.

Larva, very like that of *T. hecabe* at first sight, but with a distinct dorsal line of darker or brownish green, which is quite distinct even in the very young larva. A lateral band of light yellow each side, just above the legs, bordered with rather darker green than the general colour, both above and below. Otherwise the larva is bright green, finely striated or ridged transversely, and slightly pubescent with short whitish hairs, as in the larva of *T. hecabe*, but the latter has no dorsal line and the lateral bands are almost white.

Pupa, very like that of *T. hecabe*; sometimes plain green, sometimes dotted with dusky markings. It is often suspended to blades or stalks of grass in the vicinity of the foodplant, and both larva and pupa in the case of both species harmonise beautifully with their usual surroundings.

Ixias pyrene, Linn.

The Chinese variety of this butterfly is known as *I. evippe*, Drury, a sub-species of *I. pyrene*. It is also the *Papilio sesia* of Donovan's "Insects of China." A beautiful and common

insect, very abundant in the wet season, but to be seen on the wing in every month. The underside of this butterfly has a marked seasonal variation, similar in both sexes ; in the wet forms being almost plain yellow, in the dry forms darker yellow, with numerous white and reddish-brown markings. The upperside of the ♂ in wet form has a very broad black border to the hindwing, the dry form has none, or hardly any marking ; the upperside of the ♀ varies much, but in the wet forms the ground colour is generally almost white, with a broad and suffused dark brown border to the hindwings ; occasionally almost the whole upperside is dark brown, except the diagonal white marking across the forewing and a slight patch of whitish on the anterior margin of the hindwing towards the base. In the dry form the ground colour of the upperside inclines to yellow, and there is little if any dark border to the hindwings. The wet forms are generally the larger but both sexes vary much in dimensions.

The flight of this butterfly is strong and rather wild in the ♂ ; that of the ♀ is distinctly weaker. Although it is to be seen almost everywhere, it is addicted to wooded country. It is fond of some kinds of flowers, but rarely lingers at them, spending most of its time threading through jungle and manœuvring about trees, now high up in the air, anon almost on the ground.

Fig. 12, Pl. VII. is from a ♂ of May ; Fig. 10, Pl. X a ♀ of July ; Fig. 9, Pl. XI a ♂ of November.

Egg, spindle-shaped, slightly ribbed longitudinally, yellowish-white ; attached singly either side of a leaf, but generally the upperside, of the foodplant of the larva.

Larva, figured on Pl. 3a, Fig. 17, pupa Fig. 18. Instead of being green, the pupa is sometimes very pale pinky-brown. The larva feeds on *Capparis pumila*, Champ., Nat. Ord. *Capparidæ* ; a prickly, straggling shrub common in many places in this part of China, and also found in Sikkim and Khasia.

Hebomoia glaucippe, Linn.

This large and handsome insect is quite sufficiently numerous to be a feature of the butterfly life here, and in habits is almost a large edition of *Ixias*, though its flight is perhaps even wilder and often very high. The underside of both sexes is much alike, and when the insect settles to rest on the underside of a leaf, dropping the forewings within the hindwings, it is very difficult to detect, especially when it chooses a bunch of withered leaves, as it commonly does. Commander Walker has observed that it is still better in keeping with its surroundings when drinking up moisture from damp sand ; a habit which is common to many butterflies, though I have never seen such swarms here on wet sand as have been observed in Borneo, Ceylon and other countries.

Hebomoia is a very conspicuous object as it careers wildly about, and like many other butterflies, especially other *Pierinæ*, should the ♂ see any scrap of white paper or rag will immediately visit it, evidently mistaking it for one of its own kind. It is rather fond of flowers, but spends little time over them, chiefly sailing rapidly over and about trees and foliage. It is one of the few butterflies, except *Hesperiidæ*, which seem able to extract nectar from the large and common purple convolvulus, *Ipomœa palmata*, which has a very deep bell and evidently requires a long proboscis ; the *Hesperiidæ* are able to creep right within the flower.

Fig. 2, Pl. X is from a ♀ taken in November; Fig. 6, Pl. XI from a ♂ of the same month, but the insect is on the wing practically throughout the year, though much more abundant in the wet season. The wet and dry forms vary but little, the sub-apical red streaks on the upperside of the forewing of the ♀ being rather broader and larger than in the dry form; the black or dark brown gaining slightly in the wet form. The underside of both sexes is usually more heavily marked in the wet form, which is also often larger than the dry.

Egg, stout, spindle or rather bottle-shaped, smooth, but slightly moulded longitudinally, yellowish-white; laid singly on the upperside of leaves of the foodplant of the larva, *Capparis pumila*.

Larva, figured on Pl. 3a, Fig. 15, pupa Fig. 16. When irritated or alarmed the larva draws in its legs and elevates its head and forepart of the body, its laterally swollen anterior segments and small head giving it a somewhat cobra-like aspect, and it appears to be meant as a threatening attitude.

Just hatched, the larva is dull yellow, with short and sparse white hairs.

Catopsilia pyranthe, Linn.

Also known as *C. chryseis*, Drury, and *C. gnoma*, Fabr., being the wet and dry forms respectively. Certainly the commonest butterfly here of this interesting genus, and very abundant, occurring throughout the year. In some countries the wet and dry forms of *C. pyranthe* seem to occur together at any time of the year, but here the wet and dry forms correspond very closely with the respective seasons, though overlapping is of course frequent at the change of seasons. The ♂ is almost pure white on the upperside, with a very slight black edging of the forewing; but in any case the ♂ is easily distinguished, as it has a tuft of fine hairs on the underside of the forewing, on the inner margin near the base: usually concealed by the hindwing, but sometimes erected and spread in a fringe on the upperside of the margin of the forewing.

The flight of this insect is strong, devious and very swift; it occurs everywhere over open ground and gardens, and is fond of most flowers, but dashes quickly from one to another, spending but a few moments at each blossom. It is much addicted to settling or hiding on the underside of leaves, having a predilection for withered or yellow bunches.

Fig. 9, Pl. VII is from a ♀ taken in May, or wet form; Fig. 5, Pl. XI from a ♂ of November or dry form; Fig. 9, Pl. XIII is from a ♂ of May, or wet form. The upperside does not vary much in either sex throughout, the ♀ always having more black or rather deep brown markings; but the ♂ often has no marginal edging at all on the hindwing, and very slight on the forewing. There is, however, much variation in size, especially in the females.

Egg, spindle-shaped, smooth but very slightly moulded longitudinally, white; laid singly, both on the upper and underside of the leaves and on the twigs and stems of the foodplant of the larva, *Cassia occidentalis*, Linn., Nat. Ord. *Leguminosæ*, a very common plant here, especially in the vicinity of villages, and found over most of the warmer countries of the globe. The larvæ may be found on this plant in every stage at almost any time of the year. They rest on

the upperside of the leaves, are most voracious, and very soon entirely strip many of the plants. They vary much in the breadth of the lateral black band, which in some individuals is very broad, in others made up of almost isolated black tuberculous spots. These variations in the larva do not appear to affect the resulting butterfly.

The larva is figured on Pl. 3a, Fig. 21, pupa Fig. 22. The larvæ seem to be very subject to the attacks of wasps, which carry them off to feed their young; and ants, which haunt the Cassia plants in numbers, destroy many eggs and probably young larvæ.

During the wet season the immature stages of *C. pyranthe*, from the newly-laid egg to the freshly-emerged imago, are sometimes rapidly run through in twenty days, of which I have had several examples during May, the eggs being laid early on the morning of the 5th, the butterflies emerging very early in the morning of the 25th. The abundance of this insect is therefore not surprising.

Catopsilia pomona, Fabr.

The two widely-differing butterflies of this species were long known as *C. catilla*, Cram., and *C. crocale*, Cram., but they have been proved to be merely dimorphic females of *C. pomona*, Fabr. The ♂ seems to be much more numerous here than the ♀, and is common during the wet season from about June to October inclusive. It is most abundant in the autumn, and has an exceedingly swift and wild flight, hardly lingering a moment at flowers, though it is fond of them, especially Lantana. It wanders all over the country, but seems to have a preference for districts fairly wooded, and broken, jungly ground. The ♂ has a tuft of erectile hairs on the forewing, as in *C. pyranthe*.

The form of ♀ shown at Fig. 19, Pl. IX is rare, but I have taken it every month from May to the beginning of December, but only once in the latter month; those taken earlier in the year often incline more to sulphur yellow on the upperside: autumn specimens are usually of a darker yellow, inclining to orange.

The other form of ♀ shown at Fig. 20, Pl. IX, upperside only, (the underside resembles that of the ♂ at Fig. 18 of the same plate) is much commoner, and varies in the extent of black marking on the upperside of the forewing. In both sexes there is a good deal of variation in size, but the ♂ is very constant in colour and marking.

Fig. 18, Pl. IX is from a ♂ taken in October; Fig. 19 a ♀ taken in July; Fig. 20 a ♀ (the common form) of October; on Pl. 5a will be found a curious aberration of ♀, taken in September, 1905.

According to Horsfield the larva feeds on several species of Cassia, and three or four kinds grow here, especially on the outskirts of villages. The larva seems to closely resemble that of *C. pyranthe*.

On the whole it may be said that whilst *C. pyranthe* occurs commonly throughout the year, *C. pomona* is a butterfly which is only on the wing in the wet season, and is most numerous from June to October inclusive but often appearing intermittently—for two or three days being seen in large numbers, after which for some weeks but few specimens will be observed.

The flight of *C. pomona* as regards the ♂ is, if possible, more rapid and erratic than that of *C. pyranthe*, but from its bright colouring the ♂ is conspicuous on the wing. I have sometimes seen Bulbuls and various Flycatchers attempt to seize this butterfly in flight, but apparently they never succeeded, and soon abandoned the chase.

Dercas verhuelli, Van der Hoeven

This handsome butterfly, though local and keeping to wooded districts, is fairly common where it occurs, but I have only taken it from February to July inclusive, March, April and May being the months when it is most numerous; like *Catopsilia pomona* it appears intermittently even during these months; for a few days to be seen in numbers, then almost absent for some weeks. At the proper season it is usually common in the "Happy Valley" at Hongkong, and always seems to be plentiful at Pak-shan, a wooded part of Lappa or Patera island, (Tai-lien-shan in Chinese) on the opposite side of the harbour to Macao. The foodplant of the larva grows there in profusion, and is in full bloom in March, the small but clustered white flowers forming large white patches everywhere against the varied greens of the wood, most of which occupies the slopes and summit of a hill in which are numerous horse-shoe graves, to whose presence the wood probably owes its partial immunity from the firewood-gatherers.

Dercas has a fairly swift but haphazard flight, often much like a piece of paper floating erratically to the ground—first one way then the other, jerkily—so that it does not cover the ground at a fast rate, but it is fond of threading through trees and jungle, often rather high up, and has a knack of disappearing very suddenly amongst bushes, where it settles with close wings on the underside of leaves. Its square-cut outline and the colouring remind one somewhat of the "Brimstone" butterfly so common at home, but its flight and habits are quite different, as above indicated. When freshly emerged from the pupa it is a lovely insect, but unfortunately it is not a butterfly which displays its beauty much, even in the places it frequents, and besides being local is limited to a rather brief period on the wing in this part of the world. Often it takes but spasmodic flights, settling suddenly on the underside of leaves, whence it again flies jerkily to another leaf, and so on several times in succession, till it finds a hiding-place which pleases it, where it will remain a considerable time. *Dercas* seems rather fond of the flowers of *Dalbergia benthami* and is occasionally to be seen at Lantana and a species of *Mussaenda*, but it does not appear to care much for any other flowers.

D. verhuelli seems to occur in two forms, as in the case of *Papilio clytia*: both varieties being almost equally common. One form has a large apical dark brown patch in the forewing (Fig. 1, Pl. XIII): the other form has no apical patch, and but a very narrow dark edging of the forewing; but in both forms the females always appear to have the apex of the forewing much more produced and hooked than in the males, and the females are of a very pale chrome on the upperside, whilst the males are a brilliant yellow. Both forms occur together at the same season, and the form lacking the apical patch in the forewing (Fig. 2, Pl. XIII) was named *D. skertchlyi* by de Nicéville, but although I have not bred a long series from one ♀ and have not obtained the two forms from the eggs of one ♀, no difference is discernable in egg, larva or pupa of either form, which both feed on the same plant.

Fig. 1, Pl. XIII is from a ♂ taken in May; Fig. 2 of the same plate from a ♀ also taken in May.

Egg, yellow or pale orange, very small compared to the size of the butterfly; spindle—or rather flask-shaped, moulded longitudinally, each moulding milled like a coin; the egg is large in diameter at the base and narrows quickly towards the top. Laid singly, often high up, on young leaf-shoots or buds of the foodplant of the larva, *Dalbergia benthami*, Prain, Nat. Ord. *Leguminosæ*, a straggling half-climbing shrub, or woody climber festooning trees and bushes, and often of great length; only known from China. At the season when the larvæ are feeding the leaves are very shiny, soft and of a bright yellow-green, but afterwards they become coriaceous, and of a very dark green. The flowers are sweet-scented.

Larva, just hatched, pale yellow. Fullgrown, general colour bright yellowish-green, irrorated with black and slightly pubescent with very short whitish stubble. Body ridged transversely on the upper surface, each ridge bearing, on the dorsal surface, minute black tubercles, with a very short whitish bristle at the top—hence the irrorated appearance. Laterally, each side above the legs, is bright yellowish, merging upwards into the body-green, and bordered below with dark green, fading into the green of the underside. Legs, prolegs and underside green. Head green, with short white hairs or stubble. Anterior segments very slightly swollen, as in larvæ of *Ixias*, *Hebomoia*, etc. The larvæ rest on the upperside of the leaves, and are sluggish in their movements.

Pupa, smooth but sub-angular, head produced into a beak. General colour light green, the wing and dorsal ridges marked with a line of darker green. Attached by the tip of the abdomen, with a girdle round the middle. The larvæ pupate at various angles, sometimes head upwards and often the reverse. The larva and pupa will be figured later in black-and-white. The pupa is small compared with the dimensions of the butterfly.

Pieris (Ganoris) canidia, *Sparrmann*

One of the two "Whites" which are very common here, and this species is on the wing in more or less numbers throughout the year, but exceedingly numerous in the spring months. It generally has rather a feeble flight, compared to most of the butterflies here, and recalls the "Cabbage" butterflies so common at home, whose larvæ work such havoc with cabbage and other vegetable garden produce.* The larva of *P. canidia* is, so far as I am aware, the only butterfly larva here which damages vegetables and is a pest in market-gardens. This insect is one of the few butterflies which habitually feeds at the flowers of the foodplants of its larva, and it may generally be seen there in abundance, even in rough, rainy weather, large patches of the vegetables being allowed to run to flower and seed in Chinese gardens.

P. canidia in the dry form has usually more black on the forewing upperside, and the yellow or ochreous colour of the underside is also rather darker than in the wet form; the sexes are much alike, but the two roundish black spots on the forewing of the ♂, distinct on the under-

* *P. canidia* seems to me a mere race of *P. rapæ*, the "Small Garden White" at home.

side, only faintly show on the upperside compared with the ♀. The ♀ has them very black and distinct on both sides and the marginal black spots on the upperside of the hindwing of the ♀, often large and almost coalescing, are sometimes almost obsolete in the ♂.

Fig. 8, Pl. XI is from a ♂ taken in April, with the lower or marginal spot distinct on the forewing, but this is often very faint on the upperside.

Egg, spindle-shaped, smooth but moulded longitudinally, yellow; laid singly on the upperside of leaves of the foodplants of the larva—cabbage, lettuce, turnip, etc., and on mignonette, nasturtium and other plants.

Larva, figured on Pl. 3a, Fig. 25, pupa Fig. 26. The larvæ rest on the upperside of the leaves, and are as abundant and voracious as those of the English "Cabbage" butterflies and skeletonise the leaves of the plants in the same manner. They have also the same disagreeable habit of appearing at the dinner-table in their special vegetables.

Pieris (Ganoris) meleta, *Ménétries*

I have taken but one specimen of this insect, an extremely tattered individual unfit for figuring purposes. Apparently it much resembles, judging from what was left of the wings, a pale ♀ *Ixias pyrene* in colour and marking of the upperside. This was taken at Macao in September.

Pieris (Huphina) nerissa, *Fabr.*

Also known as *P. coronis*, Cram. Probably quite as abundant as *P. canidia*, as it is also on the wing throughout the year and very numerous in the middle of summer, especially during June and July, at which period *P. canidia* greatly falls off in numbers. It is quite different in flight and habits from *P. canidia*, being very swift in flight and often flying very high—much like a *Catopsilia*. It is, however, very fond of flowers, though it chiefly spends its time in rapid and erratic flight about foliage, whereas *P. canidia* stops at most flowers a considerable time, and then usually flies but a few yards to the next flower, being occupied much of its time in feeding. On the other hand *P. nerissa*, though exceedingly fond of Lantana, is a wandering butterfly. The seasonal forms differ considerably, much more so than in *P. canidia*; the dry forms are much paler than the wet, both on the upper and underside, contrary to what obtains in the former species.

The ♀ in wet form is heavily marked on the upperside with dark brown, and the anal margin of the hindwing is often suffused with dark yellowish; on the underside the neuration of the hindwings is broadly bordered with yellow and dark brown scales. In the dry form the underside of the hindwings is pale ochreous, the neuration only faintly bordered with slightly darker ochreous.

The ♂ in wet form has the neuration of the upperside of the wings more or less outlined in black, the underside resembling the ♀ in wet form, but not so heavily or distinctly marked. In the dry form the neuration is not marked in black on the upperside and the underside becomes pale ochreous.

There is much variation in the markings of the upperside in both sexes, especially in the females, which in the wet forms are sometimes more or less suffused with brown over the whole upper surface.

Fig. 4, Pl. XI is the upperside of a ♀ taken in June or wet form; Fig. 10 of the same plate a ♂ of May, also in wet form; Fig. 3, Pl. XIII a ♂ of December or dry form.

Egg, spindle-shaped, smooth, whitish or tipped with pink at apex; laid singly on the upperside of leaves of the foodplant of the larva, *Capparis pumila*, Champ., Nat. Ord. *Capparidææ*, only known from S. China. Apparently the larva only feeds here on this shrub, which is common over much of this part of Kwangtung.

Larva, figured on Pl. 3a, Fig. 23, pupa Fig. 24. The larvæ rest on the upperside of the leaves.

Pieris (Catophaga) paulina, Cram.

A very pretty insect, not at all common, and it seems to occur only in the early months of the year, generally during April and May. It has a swift flight, especially in the ♂, and appears to chiefly haunt broken, bushy country, where it frequents the flowers of certain trees and shrubs which are in bloom at the season mentioned—thickly-clustered white or greenish-white small but strong-scented flowers. *P. paulina* flies swiftly from one bush to another, occasionally resting a few moments with open wings on a leaf or flower. The sexes differ much both in shape and marking, as will be seen from the figures. The females seem more numerous than the other sex, unless it be that they are conspicuously marked and easily observed, whilst the ♂ may perhaps be mistaken sometimes for *P. nerissa*.

Fig. 16, Pl. IX is from a ♂ taken in June; Fig. 17 of the same plate from a ♀, also of June. I have only taken this butterfly at Macao, but it no doubt occurs also at Hongkong.



V. FAM. PAPILIONIDÆ.

SUB-FAM. PAPILIONINÆ.

GENUS PAPILIO.

„ LEPTOCIRCUS.

The usually large and brilliant butterflies of this Family are by no means confined to the tropical regions, though they are most numerous there and attain their maximum size and most gorgeous colouring; but they are represented in every Region and Sub-region. There is one English example, *P. machaon*, which was formerly common in the fens of Cambridge and Huntingdon, but is rapidly becoming rarer. Wallace in his *Geographical distribution of Animals* says "Well-marked sub-divisions of this large genus (*Papilio*) are characteristic of each great region—as.....the *Paris* group in the Oriental." *Leptocircus* is peculiar to the Oriental Region. Most insects of the genus *Papilio* fly very swiftly, wandering far and wide, rapidly vibrating their half-closed wings whilst feeding at flowers, of which they are all extremely fond. All but two species (*P. aristolochiæ* and *P. xuthus*) which occur here are common, some of the most beautiful being almost the commonest butterflies during the wet season and on into November; towards the end of that month they become very scarce, most of them only reappearing at the beginning of the following March. The *Memnon* group is rather an exception to the rest of the genus, as their flight is comparatively slow, though strong, and they are not so intensely devoted to flowers as others of the genus; at least they do not spend so much time in feeding. *Lantana* is without doubt the favourite flower of the *Papilioninæ* here, though they frequent many other kinds also. The larvæ of this Family are, I believe, the only butterfly caterpillars here (with the exception of the larvæ of *Pieris canidia* and *Lehera eryx*) which work any real damage to cultivated plants. Nearly all feed upon various species of *Aurantiaceæ*, especially the orange, pumelo and whampi, but these trees, except the whampi, are not so extensively cultivated here as farther inland, up the West River, and they are generally much neglected; becoming the prey of hosts of Hemipterous insects or "bugs," aphides and many other hurtful creatures which appear to shrivel and canker the leaves, probably doing more real mischief to the trees than larvæ which eat away the leaves cleanly, and whose depredations are not much noticed except on very young plants. The eggs of the *Papilioninæ* are almost invariably laid on the upperside of leaves and stems, especially young leaves and shoots, and the larvæ nearly always rest on the upper surface of the leaves, in full view; though even then the majority of them are difficult to detect, the larva of *P. clytia* being a striking exception. The larvæ all appear to have a large forked process, or nuchal horn, which can be exerted at will from a narrow and almost imperceptible slit on the top of the second segment, just against the head. The pupæ all have a band or girdle round the middle and, except the pupa of *P. clytia*, are angular and much alike, usually of various shades of

either green or brown. The butterflies have the forelegs perfect and use them in walking. The palpi are very short and hardly seen, viewing the insects from above. The males often have long white silky hairs springing from the inner or abdominal margin of the hindwing on the upperside, usually concealed by a natural fold of the margin, which turns over on these hairs. They are conspicuous in *P. sarpedon*, *P. agamemnon* and others of that group; but the sexes in this Family are easy to distinguish, as the anal clasps of the ♂ are large and not concealed by thick hairs or scales. The eggs of the *Papilioninæ* are globular and smooth. January, February and December are the only months when butterflies of this Family are scarcely to be seen here, and it the season is unusually propitious many emerge during the end of February.

Papilio aristolochiæ, Cram.

I have never seen this insect in the neighbourhood of Macao, and it is very scarce at Hongkong. Commander Walker says it is common in the Chusan islands, and it occurs at Shanghai. It is perhaps sometimes mistaken for the "red" female of *P. polytes*, but its shape and the crimson on the abdomen readily distinguish *P. aristolochiæ* at some distance. It seems to have become rarer of late years at Hongkong. This butterfly frequents wooded country, and has the usual habits of the genus. The ♂ and ♀ are practically alike.

Fig. 6, Pl. XII is from a ♀ taken in May.

Papilio paris, Linn.

Variety *chinensis*, Rothschild. One of the loveliest of the butterflies here, and fairly common, with the usual *Papilio* habits and characteristics—sometimes feeding very intently at Lantana and a few other flowers, but chiefly wandering swiftly up and down shady paths and following the outskirts of woods, often diving into jungle and threading its way through the foliage, or on the other hand soaring over tree-tops. This insect ranges northwards to Peking, where it is common.

Fig. 1, Pl. XII is from a ♂ of October, but the sexes are practically alike—the ♀ nothing inferior to the ♂ in brilliancy.

Egg, globular, smooth, yellowish; laid singly.

Larva, just hatched, brownish. When young, of a general light green, the second, third and fourth segments, as is usual in *Papilio* larvæ, much swollen; two processes on each of these segments, those on the second seg. being largest. Last seg. yellowish, with two processes, one each side. A white suffused dorsal patch or smear on the fifth and sixth segs., extending down the sides. The larva, as in most young *Papilio* larvæ, has a very shiny or varnished appearance. Later, head and general colour light green, a whitish blotch on the fifth and sixth segs., and a white, irregular line just above the prolegs. Two processes on the second and two on the last segment, the other processes having become practically obsolete. Half-grown, general colour a bright moss-green, the processes on the anterior segs. obsolete, the two on the last seg. very small and of a light yellow. A white tumous line or band over the back, following near the articulation of the fifth and sixth segs., and continuing laterally to the head, where

it becomes yellowish. A white lateral line each side just above the prolegs. A small brown ocellus on each side of the fourth segment. The same description applies to the fullgrown larva, but it is slightly irrorated with yellow in places on the body. Head green. It feeds on *Xanthoxylum nitidum*, D.C., Nat. Ord. *Rutaceæ*, a very prickly woody climber, or half-climbing shrub, not known out of S. China, but very common in this district.

Pupa, sub-angular, general colour bright green, the dorsal and wing ridges light yellow. Head cleft very obtusely, forming two projections. Two very small black tubercles close together on the underside of the head. It somewhat resembles the pupa of *P. antiphates*. Attached by the tip of the abdomen, with a girdle round the middle.

Papilio bianor, Cram.

Not so common as the former species, but with much the same habits, though it has a rather slower flight and stays more frequently to feed at flowers. It varies greatly in dimensions, from $3\frac{1}{2}$ to $4\frac{3}{4}$ inches over the forewings, but four inches is about the average. The sexes are very similar, but the ♂ has the median interspaces on the upperside of the forewing coated with dense hair-like scales, resembling dark brown fur.

Fig. 2, Pl. XII is the upperside of a ♂ taken in June; the underside of the hindwing is similar to the upperside, but the lunules in the margin are much more distinct, and are all bright ferruginous centred with light purple or pink. The ground colour is dark sooty brown, irrorated towards the base and disc. cell with pale ochreous, much like the underside of the hindwing of *P. paris*, and the underside of the forewing also resembles that of the latter species; in fact the forewings of all the species of this group are almost identical on the under surface as regards colouration.

The egg is like that of *P. paris*.

Papilio memnon, Linn.

A common butterfly here, remarkable for the ♂ possessing two very distinct forms of ♀, one with a plain hindwing, the other ornamented with a large "tail." The ♂ is fond of shade, especially roads beneath trees and the paths through woods, where it often takes up a regular "beat" for a day or two, sailing along with a strong but not particularly rapid flight. The first form ♀, distinguished as *P. agenor*, Linn., is common and probably exceeds any other butterfly here in the average breadth over the forewings; the second form ♀ with the tailed hindwings, known as *P. phœnix*, Distant, is decidedly uncommon.

Fig. 5, Pl. X is the upperside of a ♀, form *phœnix*, taken in November; the underside is very similar to the upper surface. Fig. 6, Pl. X is the upperside of a ♀, form *agenor*, taken in September; both upper and undersides are much alike; there is much variation in the extent of white or pale ochreous in the median interspaces of the hindwing, some individuals having much more white, others much less, than the specimen figured. Some females of this form (*agenor*) measure very nearly six inches over the expanded forewings. Fig. 9, Pl. X is the underside of a ♂

taken in May ; in some specimens the large marginal black spots ringed with red of the hindwing are very bright and distinct : in others only the two anal markings are present, the rest of the spots being indicated by a few red scales, or merely by dark and light shades of the ground-colour. The upperside is uniform blue-black, irrorated with whitish or pale gray, in bands following the neurulation of the wing. The extreme base of the disc. cell of the forewing is, however, marked with red on the upperside, much like the under surface, but of less extent.

Egg, globular, slightly flattened on the underside, yellowish ; laid on the upperside of leaves of the foodplants of the larva.

Larva, figured on Pl. 4a, Fig. 1, pupa Fig. 2. Just hatched the larva is dark brown, with several delicate white processes, longest on the anterior and last segments ; white dorsal patches on the anterior, middle and posterior segs., so that when newly-hatched the larva appears chiefly white. When half-grown it becomes green, smeared with white on the sides, and with four small yellowish processes, two on the second seg., two on the last segment. The whole larva is then very shiny, as if wet or varnished. It feeds on various species of *Aurantiacæ*—orange, pumelo and especially the whampi, *Clausena wampi*, Oliv. The eggs laid in November or beginning of the dry season hatch in about six days, the larvæ pupate about the middle of December, and the butterflies emerge as a rule in the early part of April.

As is the case with other *Papilio* pupæ, that of *P. memnon* is sometimes green instead of brown, with two triangular dorsal patches, forming one large lozenge-shaped abdominal patch of a bright yellow-green. Whilst pupation is proceeding the projections formed by the cleft of the head are quite distinct and apart and only curve inwards and meet in a loop or ring just as pupation is completed. The nuchal horn of the larva is dark red, the tips semi-transparent.

Papilio protenor, Cram.

Usually not nearly so common as the preceding insect, yet some years it occurs in large numbers, especially in the autumn. The ♂ seems much more numerous than the ♀. This butterfly is rather slower in flight than *P. memnon*, and spends more time at flowers, but it frequents wooded and shady localities like the former species. There is much variation in size in both sexes.

Fig. 7, Pl. X is from a rather small ♀ taken in April, but it often measures upwards of five inches over the forewings. Fig. 8 of the same plate is the upperside of the hindwing only, from a ♂ taken in October. The underside of the hindwing is very similar to that of the ♀, whilst the forewing is on both sides like that of the ♀.

Papilio helenus, Linn.

A very common species, with a powerful and wandering flight, and one of the few *Papilioninæ* which may sometimes be seen during February and December, and very rarely in January. It varies much in dimensions, some of the females attaining a large size, four and three-quarters or nearly five inches over the forewings. The sexes are almost identical in colour and marking.

Fig. 3, Pl. XII is from a ♂ taken in November.

Egg, globular, smooth, yellowish.

Larva, in its earlier stages very like that of *P. polytes*, having two rows of small dorsal processes, the two pairs on the last segments being white, the rest yellowish-brown, the pair on the second seg. longer than the others. Fullgrown larva figured on Pl. 4a, Fig. 7, the young stage shown beneath. The fullgrown larva is hardly distinguishable from large individuals of *P. polytes*. The pupa is shown at Fig. 9, Pl. 4a, and is either green with a bright yellow-green lozenge-shaped dorsal patch, or various shades of brown. The larva feeds on *Xanthoxylum nitidum* and on orange, etc., but chiefly on the former plant. The nuchal horn of the larva is vinous red.

Papilio polytes, Linn.

Like *P. memnon* this insect possesses two forms of ♀, that almost identical in marking and colouring with the ♂ having been named *P. pammon*, and the other form *P. polytes* by Linnæus. It is, perhaps, the commonest *Papilio* here, exceedingly numerous all through the wet season, and occurring every month, though scarce in January. The form of ♀ resembling the ♂ is the common one here, the other form of ♀ being rather scarce by comparison. All the members of this "black" group of *Papilioninæ*, as we may perhaps term the butterflies belonging to this Family so far described, are continually diving into thick foliage and jungle, threading their way through the tangle of branches, creepers and thorny bushes with great dexterity, yet one may often hear the wings strike a twig or leaf, and probably much of the ragged and tattered condition of many individuals is due to this cause. Some of them, especially *P. polytes*, also visit the large scarlet flowers of *Bombax ceiba* and other large trees, where their hindwings and abdomen become covered with bright yellow or red pollen, so that sometimes one is deceived for a moment, thinking that a species new to the district has occurred!

Fig. 4, Pl. XII is from a ♀ taken in October, upperside only, form *polytes*. The underside is very similar to the upper surface. Fig. 5 is from a ♀ taken in May, form *pammon*. The ♂ is almost identical with Fig. 5.

Egg, globular, smooth, yellowish, laid singly on the upperside of leaves and stems, usually the very young leaves and shoots, as in the case of other *Papilioninæ*. Although the eggs are laid singly, yet when young, tender shoots are scarce several eggs may be seen laid close together. The larva when very young is of a shiny yellow-brown, smeared with large patches of white, and emits a strong and disagreeable odour, especially when disturbed. It bears a strong resemblance at this stage to the excrement of a small bird, and like other larvæ of this Family almost invariably rests on the upperside of the leaves. A little later the anterior segments become marbled with white, dark yellow and very dark brown. Fullgrown, general colour green. The larvæ of this butterfly and *P. helenus* are hardly distinguishable at any stage, and the pupæ are also very much alike. Both are sometimes green, sometimes brown in general colouring, and both vary in the angle to which the pupa is bent; some having the upper part turned almost at a right-angle to the abdomen, others having a comparatively slight inclination, and they also vary as to the depth of cleft of the head.

The larva feeds on *Xanthoxylum nitidum*, orange, etc. The nuchal horn is yellowish-red.

Papilio demoleus, Cram.

Also known as *P. erithonius*, Cram. Another very common butterfly, almost as abundant as *P. polytes*. It seems to prefer more open country than most of its congeners, but it occurs practically everywhere. Freshly emerged the markings are bright but pale chrome yellow; this soon darkens to ochreous yellow, and in specimens which have long been on the wing, the yellow apical spots in the forewing become nearly white. The sexes are very much alike, but instead of the ocellus in the anal angle of the hindwing of the ♀, the ♂ has a plain red marking without any blue ring or black spot on the upperside of the hindwing, though on the underside there is scarcely any difference between ♂ and ♀.

Fig. 7, Pl. XIII is from a ♀ taken in May.

Egg, globular, smooth, yellowish, laid on leaves and shoots of the foodplants of the larva, usually *Atalantia buxifolia*, but it also feeds on orange.

Larva, figured on Pl. 4a, Fig. 9, the young stage shown just beneath. The pupa is much the same shape as that of *P. polytes*, some pupæ being of a dirty white variegated with brown, some green, and others of a pale ochreous pink, inclining to orange on the abdomen.

The nuchal horn of the larva is orange-yellow.

Papilio clytia, Linn.

Also known as *P. dissimilis*, Linn. A very common and interesting butterfly, both sexes having two quite distinct forms. The brown form was named *P. panope* by Linnæus. Two individuals of the widely differing forms may fairly often be seen in cōp., as well as two of like form, and eggs laid by one ♀ produce the two forms indifferently, both being common, though the brown variety is not quite so numerous as the other. The ordinary form bears some resemblance at a distance to *Hestina assimilis* and the blue Danaids, whilst the brown form may easily be mistaken for a *Euploea* when flying slowly or feeding at flowers. Both forms fly very much like the *Danaine* when searching for a plant on which to lay their eggs, though usually their flight is rapid, much like that of other *Papilioninæ*. *P. clytia* is another of those butterflies which may often be seen with hindwings and body covered with the bright red or yellow pollen of some tree.

Fig. 1, Pl. XI is from a ♂ taken in October, and the commoner form of ♀ is exactly the same in colour and marking; Fig. 2 is an unusually dark ♀ taken in October; Fig. 3 is also from a ♀, taken in June, but the ♂ of this brown form is similar in colour and marking. In this brown variety, however, there is much variation in the distinctness of the white markings, many specimens being intermediate between Figs. 2 and 3. I have once seen this large butterfly seized by the head and killed by the small white ambush-spider, which was concealed in a flower and held on determinedly to its prey in spite of the struggles of the latter. *P. clytia* is also frequently captured and devoured by the large spider, *Epeira maculata*.

Egg, globular, smooth, yellowish, laid on the upperside of leaves and shoots of *Litsea sebifera*, Pers., Nat. Ord. *Laurinæ*, a very common shrub or small tree in this district, the foodplant of the larva, nor have I ever found it on any other plant, though the larvæ of nearly all the *Papilioninæ* occurring here will at times feed on orange. The larva is also an exception in colouring to most of the larvæ of this Family, being very conspicuous as it rests on the upperside of the leaves, whilst the pupa differs entirely in shape from the usual type.

Larva, figured on Pl. 4a, Fig. 3, pupa Fig. 4. The young larvæ are easily distinguishable from those of other species, much resembling the fullgrown larvæ but that the yellow is more of an orange tint: the dark parts are black; the crimson spots, however, do not develop till the larva is about half-grown; before this the spots are yellow, like the patches on the body. The black, pliable processes on the back are quite distinct in the young larva. Nor does the larva of any other *Papilio* here appear to feed on *Litsea sebifera*. Just after each moult the dark parts of the larva have a curious mottled appearance, but soon resume the normal purple-black tint.

The cylindrical pupa is flattened on the upperside of the last abdominal segments, forming a broad support at an angle, and the tip is very firmly attached to the branch or twig by a tangle of black filaments. The girdle round the middle is in places enclosed by the chitinous envelope of the pupa, as the loop is embedded in an articulation of two segments during pupation; so that the pupa appears to be supported by a black thread each side. I have never seen this pupa any other colours but varying shades of brown, ochreous and whitish—very much like a piece of bark or stick.

The nuchal horn of the larva is bluish-gray.

Papilio antiphates, Cram.

A very common insect, with a rapid, wild and often high flight, but it is only on the wing in numbers at certain periods: in the intervals scarcely a specimen will be seen. It is a beautiful creature when just emerged in the morning, but by evening its headlong flight over and through thick jungle has usually robbed it of part at least of the long, slender tails, and in two or three days it is reduced to a very ragged condition. The larvæ seem often to pupate in early summer and remain in the pupal state till the next spring, for I have bred many larvæ which pupated in June, the butterflies not emerging till the following March or April. I am not aware of this being the case with any other butterflies here. *P. antiphates* is most numerous in the spring and autumn months.

Fig. 7, Pl. XI is from a ♀ taken in April, but the sexes are alike.

Egg, globular, smooth, yellowish; laid on young leaves and shoots of *Uvaria microcarpa*, Champ., Nat. Ord. *Anonaceæ*, a very common shrub here, with a rather large dark red, waxy and thick-petaled flower, the foodplant of the larva which, however, will also feed on orange.

Larva, figured on Pl. 4a, Fig. 5, pupa Fig. 6. The young stage of the larva is shown below on the same plate. The pupa is apparently always green in general colour.

The nuchal horn of the larva is greenish-yellow, and is shown protruded in the figure of the fullgrown larva.

Papilio sarpedon, Linn.

A common and very beautiful species, with an exceedingly swift, wild flight, and though very fond of flowers it spends but a moment at each blossom, rapidly quivering its wings whilst feeding. Unfortunately the lovely greeny-blue of the wings is fugitive, turning green or yellow with age. Owing to its wild flight and habit of threading through jungle it is not often to be secured in good condition, and is usually very ragged. Like several other *Papilioninæ* this insect often takes up a special beat, generally rather high up about the tops of trees, where it flies up and down, chasing away butterflies and other insects which encroach on its domain.

Fig. 5, Pl. XIII is from a ♂ taken in May, but the sexes are very similar. The ♂, however, has a fringe of long white, silky hairs on the upperside of the abdominal margin of the hindwing, usually concealed by the natural fold of the wing, which is turned down over the hairs. In both sexes the broad blue band (white on the costal margin) down the hindwing is often broken up into separate spots, sometimes very small, or almost obsolete. This butterfly varies much in dimensions.

Both larva and pupa are very much like those of *P. eurypilus*. The larva feeds on the orange tribe and on *Laurus camphora*.

Papilio eurypilus, Linn.

Not by any means a common insect near Macao, more plentiful at Hongkong. It has not quite so swift a flight as other butterflies of this group, and it feeds rather more leisurely at flowers. It is also known as *P. telephus*, Felder. The sexes are alike, but the ♂ has a fringe of white hairs on the hindwing, as in the ♂ of *P. sarpedon*.

Fig. 4, Pl. XIII is from a ♀ taken in September.

Egg, globular, smooth, yellowish.

Larva, just hatched, dark brown and yellowish, a pair of small processes on the second, third and fourth segments, and a rather larger pair on the last segment. A few days after hatching the larva becomes wholly dark brown on the upper surface, the processes, except those on the second and last segs., gradually becoming obsolete, as is usual with many *Papilio* larvæ. Whilst still young, upper surface dark brown, two small brown processes on the second seg., two small yellowish processes on the last seg. An indistinct lateral whitish line just above the

prolegs each side. Head yellow. Fullgrown, general colour bright green, a small white ocellus pupilled with black on each side of the fourth seg. The processes as before, but yellow, tipped with black. A white lateral band just above the prolegs each side.

Pupa, not unlike that of *P. antiphates*, but the projection on the head is longer and sharper. The colour varies from shades of brown in some specimens to a general rather bright green in others.

Papilio agamemnon, Linn.

This beautiful and common insect is very numerous indeed throughout the wet season, and even occurs sparingly in February and December, but I have never observed it during January. It has just as rapid a flight as *P. sarpedon*, but is also very fond of flowers, and is not in quite such a hurry whilst feeding as the latter butterfly. There is much range in size, some specimens being very small, but the sexes are alike, except that the ♂ has the fringe of white hairs on the hindwing, as in the two preceding insects. When resting on a leaf it usually keeps the wings spread, but the forewings slightly drooped over the lower pair, as is customary with other species of *Papilio*, though they sometimes rest with closed wings.

Fig. 6, Pl. XIII is from a ♀ taken in May.

Egg, globular, smooth, yellowish.

Larva, figured on Pl. 4a, Fig. 10, the young stage shown below. The pupa is much like that of *P. sarpedon*, light green in colour, the spiracles marked in dusky: the head projection and outline of the wings marked with reddish-brown. Two indistinct yellow dorsal lines.

The larva feeds on several plants, amongst which are *Uvaria microcarpa* and *Unona discolor*, Vahl, Nat. Ord. *Anonaceæ*, the latter a very common shrub here, and widely spread over the warmer parts of Asia; *Michelia champaca*, whose strong-scented flower-buds Chinese women are so fond of wearing in their hair; and occasionally the larva may be found feeding on the Custard-apple *Annona reticulata*, Linn. Just before pupation the larva changes to a beautiful hyaline or semi-transparent green. The nuchal horn is yellowish.

Papilio xuthus, Linn.

Not common, but sometimes occurs in some numbers near Macao in the autumn; usually very scarce at Hongkong, but appearing there sporadically. It has the slowest flight of all the *Papilioninæ* here, but is very graceful on the wing. It is much attached to flowers, especially *Lantana*, feeding leisurely and not vibrating its wings so rapidly as most of the other species. It is very often in exceedingly tattered condition, but when freshly emerged it is a handsome butterfly. *P. xuthus* is common in the Chusan islands, at Shanghai and in Japan.

Fig. 1, Pl. X is from a ♀ taken in October, but the sexes are alike, some of the females being very large, but this insect varies greatly in dimensions. I have never taken it except in the autumn, October and November being the season when it usually occurs here. It breeds in this district, as I have taken specimens but just emerged from the pupa.

Leptocircus curius, Fabr.

Very scarce and sporadic, some years practically absent. I have not seen it at Macao, and it appears to be getting rarer at Hongkong of late years. On the wing it somewhat resembles certain species of dragonfly, but I have seen so little of this insect that I cannot do better than quote Commander Walker's account in the Trans. Ent. Soc. of London, for 1895. He says "The headquarters of this lovely little butterfly in Hongkong is the 'Happy Valley,' where I first met with it on February 13th, 1892, and on March 12th I took a very fine series; in 1893 it was scarce, and did not appear before April 2nd. It is hardly possible to imagine a more dainty and elegant little creature, as it feeds at the white blossoms of its favourite shrub, *Buddleia asiatica*, probing flower after flower of the racemes with its proboscis, with the long tails of the hindwings elevated and quivering, and vibrating its wings all the time without actually settling, like its larger relatives the *Papilio*'s. When alarmed it 'booms' off rapidly, with a flight resembling that of the larger *Hesperiidae*. I have never seen it hovering over running water in the manner described by Mr. H. O. Forbes (Nat. Wanderings in the Eastern Archip. p. 139), although there is a fine stream in the gardens at 'Happy Valley.' It is by no means easy to obtain *Leptocircus* in good condition, the long, delicate tails being very liable to damage."

Fig. 4, Pl. X is from a ♀ taken at Hongkong in March, but the sexes are very similar.



GENERAL NOTES.

The ants which attend on the larvæ of *Spindasis lohita* have a very strong smell, at least when hundreds of them are together, and on opening a large nest this odour is almost overpowering, though not exactly unpleasant. It even seems to taint the air in hot, damp weather in the localities inhabited by these ants. On disturbing a nest the inmates at once swarm over the hands, immediately seizing hold with their jaws, but their nip is insignificant. It is quite another matter if a nest of the large shiny jet-black ants is attacked by mistake, for their bite is severe, and they hang on like bulldogs, so that the body may be torn away and the jaws left in the flesh. By inadvertence one day a black ant was placed in a jar containing many of the species with which *Spindasis* larvæ live; one after another of the latter would walk timidly up to the black ant and gently touch it with vibrating antennæ. The black ant, however, seemed rather scared by the numbers of the red ants, and remained perfectly quiet, and was removed before doing any mischief.

Both these ants seem confined to wooded or bushy country; the species which enters houses, boats, everywhere in fact, and destroys or carries off anything eatable is a much smaller ant than the species which attends *Spindasis*, though resembling the latter and also of a red-brown colour. During the wet season a dead bird, butterfly or beetle is not to be laid down anywhere in the house for more than a few minutes before the carcase swarms with these little pests, and a long column is observed stretching from the dead creature down the leg of a table or the side of a box, along the floor and under the door, or up the wall and along the ceiling—from some obscure crevice the ants are sure to march in thousands, though not one was to be seen a few minutes before, but they seem to scent food in even a more mysterious way than vultures. They will often carry away, grain by grain, the birdseed out of a cage hanging from the ceiling by a wire or cord, travelling up and down thereby; if the desired object is isolated by water and a spider has opportunely bridged the space, the ants soon avail themselves of his silk ladder. These are the ants which seem specially to destroy larvæ and pupæ, and often a broad column of them may be observed crossing a dusty path, with a large object being pulled, pushed and hustled along, over rather than around obstacles, which on closer inspection proves to be a larva or pupa of some moth or butterfly. No doubt, however, the ants play a large part in scavenging, and clearing away dead creatures which otherwise would become offensive.

Mould or fungoid growth always forms on many butterflies in a collection during the rainy season here, unless they are kept in a special drying-room; some few species seem rarely to be attacked by mould, except on the antennæ, on which it almost invariably forms. The first butterflies to get mould are the *Euplexina*, on which it heaps up till the body and much of the wings are quite hidden; when alive these insects are very juicy, and on pinching the thorax severely a clear yellow liquid exudes from all joints, quite thin and watery—probably the reason why these butterflies so soon gather mould, and also why they are distasteful to many insect-eaters.

The mantis has already been noted as a butterfly-destroyer and a very bold insect, but occasionally it tackles some creature which it had better have left in peace.

On two or three occasions I have seen it seize a large hornet, when after a short struggle both insects would fall together to the ground from the shrub. The hornet would then fly away, and the mantis start off to climb the tree again, both combatants evidently glad to be well rid of each other, but the mantis quite ready to grab at the next hornet which strayed within its reach.

Cuckoos (of which we have here four or five species in the wet season) are great devourers of lepidopterous larvæ. Most birds dislike or reject hairy larvæ, but the cuckoo seems to eat them all indifferently. The very hairy caterpillars he rubs up and down on the rough bark of a tree till most of the hairs are broken off; an operation I have watched at close quarters, well hidden in jungle. Moreover, as the Cuckoo tribe all appear to sing at intervals throughout the night they are probably nocturnal as well as diurnal feeders, and most larvæ feed chiefly during the night, so that these birds must destroy countless numbers of them. The Rainbird (*Cacomantis merulinus*) whose insistent notes day and night have earned him the title "Brain-fever-bird," probably accounts for hosts of larvæ during his stay with us, from the end of February or beginning of March till the end of August, though it is silent in that month and the end of July.

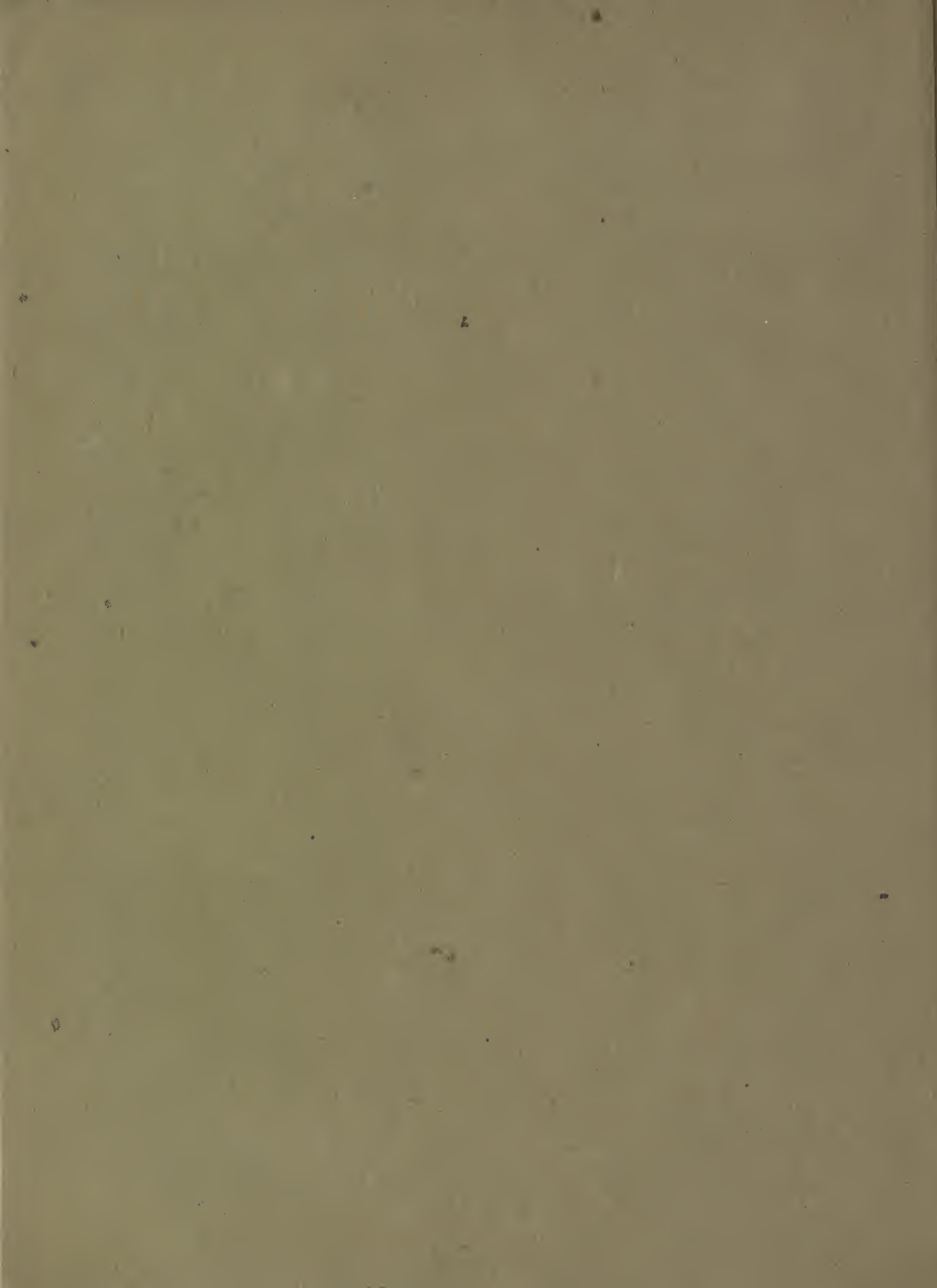
The young birds are still here, however, till the end of September, and probably on into October. The white-eyes (*Zosterops*) Tailorbirds (*Orthotomus*) and Titmice are certainly the greatest consumers of small larvæ, etc., and as they are resident throughout the year and some of our commonest birds, most likely do more than any other birds to keep down the numbers of insects.

The colours of some butterflies fade very quickly after death, though they also lose their pristine brightness from ordinary wear and tear and weather during their lifetime. The bright cobalt blue patch in the hindwing of *P. paris* soon changes to a decided green, though still retaining its metallic sheen; but the beautiful greeny-blue of *P. sarpedon* and *P. eurypilus* tends to fade into dull green or yellow. The pale but bright and fresh chrome yellow of *P. demoleus* when just emerged from the pupa soon turns to a rather dark ochreous yellow, as does the yellow of *P. xuthus*. The light green bands in the forewing of *P. antiphates* in course of time becomes yellowish.

The nuchal horn or retractile process near the head, mentioned at page 106, which seems to exist in all *Papilio* larvæ, are pliable, hollow, semi-transparent organs, united at the base but forked into two branches, extruded from a slit on the top of the second segment when the larva is irritated or alarmed, quivered in the air a few moments and again drawn within the segment, the slit closing up completely. If touched from behind, the horn is thrown backwards or the larva turns its head and attempts to smear the fingers with its moist surface. This curious organ emits a very strong and nauseous smell, which clings tenaciously to anything which is touched by the appendage; evidently a means of defence against some of the enemies of the larva. This nuchal horn is shown exerted in the figure of the larva of *P. antiphates*, Pl. 4a. The pupæ of all the *Papilioninæ* here, except that of *P. clytia*, are supported by a girdle of white or yellowish silk, but that of *P. clytia* is black, which certainly harmonizes well with the colours of the pupa and its usual environment, for it always appears to pupate against a brown stem or twig, whereas the other species often secure themselves to green leaves or branches. Yet the larva of *P. clytia* is brilliantly coloured and a conspicuous object as it rests in full view on the upperside of a leaf; but bright colouring in larvæ is generally supposed to be synonymous with nauseous taste or odour, and if the warning colour is not sufficient to ward off enemies, the larva will use his nuchal appendage. But the pupa is absolutely defenceless, and its best chance of safety lies in assimilating so closely to its surroundings that it is sometimes passed over even by the sharp eyes of birds and other pupæ destroyers.

As has been noted already, many of the *Papilio* larvæ in their young stages differ entirely in colour and marking from the fullgrown caterpillars, and most of them have a series of well-marked dorsal processes when very young, nearly all of which gradually disappear as the larva grows. The very young larvæ do not seem to have the power of putting forth the nuchal horn.





Part VI.

BUTTERFLIES
OF
HONGKONG
AND
SOUTH-EAST CHINA.

J. C. KERSHAW, F.E.S., F.Z.S.

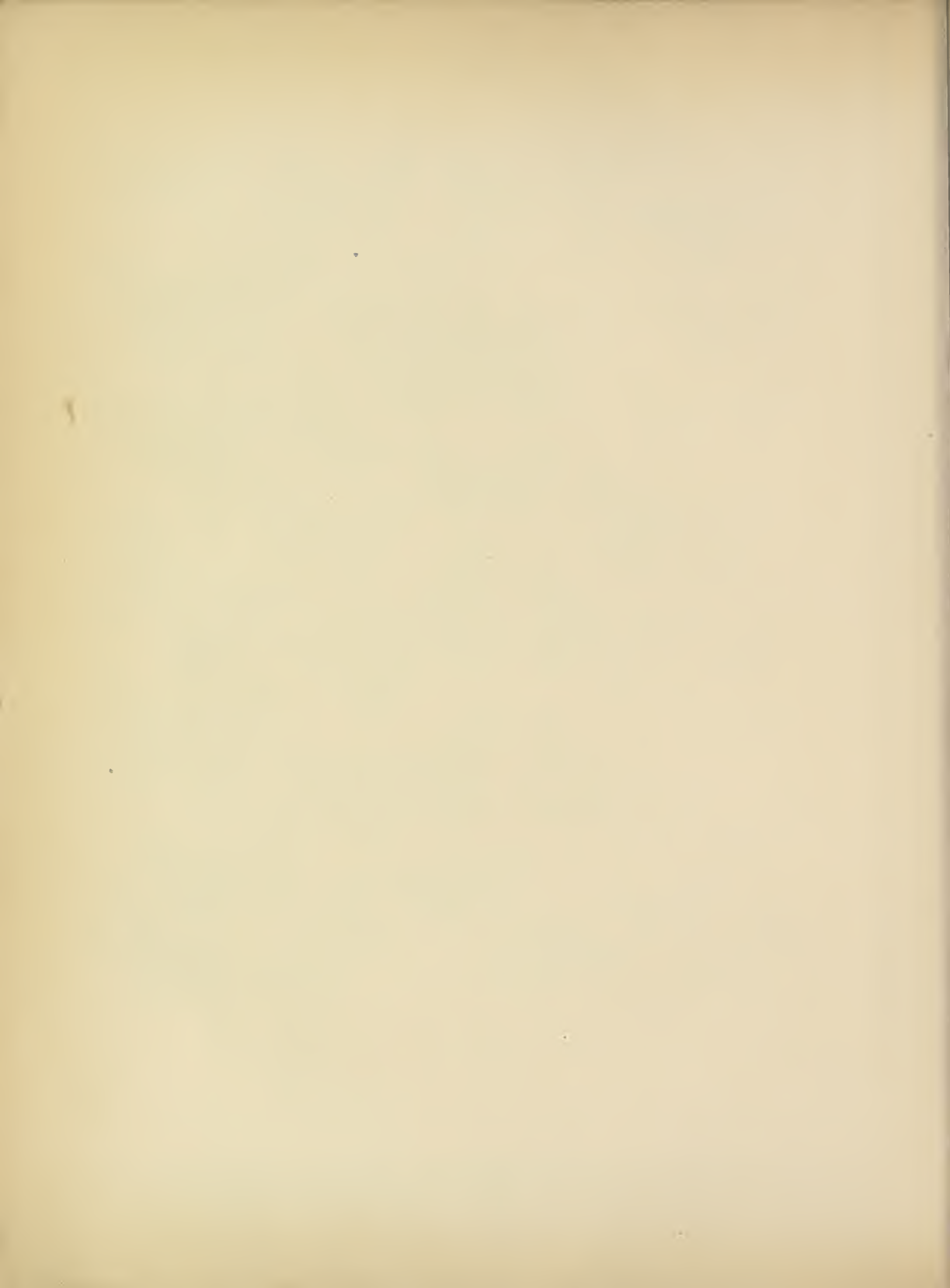
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PLATE XIV.

- 1.—CAPRONA ALIDA, *de Nicéville* ♀
- 2.—CAPRONA SYRICHTHUS, *Felder* ♂
- 3.—ODONTOPTILUM SURA, *Moore* ♀
- 4.—HYAROTIS ADRASTUS, *Cram.* ♂
- 5.—BAORIS ASSAMENSIS, *de Nicév.* ♂
- 6.—ERIONOTA THRAX, *Linn.* ♀
- 7.—HALPE MOOREI, *Watson* ♂
- 8.—BAORIS OCEIA, *Hewitson* ♂
- 9.—IAMBRIX SALSALA, *Moore* ♀
- 10.—ASTICTOPTERUS HENRICI, *Holland* ♀
- 11.—TAGIADES ATTICUS, *Fabr.* ♂
- 12.—BAORIS PELLUCIDA, *Murray* ♀
- 13.—HASORA BADRA, *Moore* ♀
- 14.—HASORA BADRA, *Moore* ♂
- 15.—KERANA DIOCLES, *Moore* ♀
- 16.—ISMENE ATAPHUS, *Watson* ♂
- 17.—HASORA CHROMUS, *Cram.* ♀
- 18.—AMPITTIA MARO, *Fabr.* ♂
- 19.—BADAMIA EXCLAMATIONIS, *Fabr.* ♀
- 20.—UDASPES FOLUS, *Cram.* ♀
- 21.—TARACTROCERA ATROPUNCTATA, *Watson* ♂
- 22.—PADRAONA DARA *Kollar* ♂
- 23.—NOTOCRYPTA FEISTHAMELII, *Boisduval* ♂
- 24.—MATAPA ARIA, *Moore* ♀
- 25.—SUASTUS GREMIUS, *Fabr.* ♀
- 26.—PARNARA GUTTATUS, *Bremer and Grey* ♂
- 27.—BAORIS COLACA, *Moore* ♂
- 28.—TELICOTA AUGIAS, *Linn.* ♂
- 29.—ISMENE ATAPHUS, *Watson* ♀



VI. FAM. HESPERIIDÆ.

1. GENUS TAGIADES
2. „ ODONTOPTILUM
3. „ CAPRONA
4. „ SUASTUS
5. „ IAMBRIX
6. „ HYAROTIS
7. „ MATAPA
8. „ ERIONOTA
9. „ TARACTROCERA
10. „ AMPITTIA
11. „ PARNARA
12. „ BAORIS
13. „ PADRAONA
14. „ TELICOTA
15. „ UDASPES
16. „ HALPE
17. „ ASTICTOPTERUS
18. „ KERANA
19. „ NOTOCRYPTA
20. „ HASORA
21. „ BADAMIA
22. „ ISMENE

This large and very distinctly characterised Family is represented by species in almost every part of the world, though many of the genera are restricted in their range. The *Hesperidæ* or Skippers seem to form a link between butterflies and moths, and Sharp in the "Cambridge Natural History, Insects Pt. II," says that they are more nearly allied to the *Heterocera* or moths than to the *Papilionidæ*. In the Skippers the six legs are perfect; the abdomen is straight and usually pointed or flattened at the tip; the antennæ are thickened before the actual tips, which are more or less bent backwards, forming hooks. Some Hesperids are decidedly crepuscular, even

flying long after dusk; others seem to delight in the hottest sunshine, but the majority appear to be most active early in the morning, soon after sunrise, and late in the afternoon and evening. Most of them have an exceedingly swift, erratic flight; some of the larger and swifter species make a loud humming noise, so rapidly do they cleave the air. They do not, however, usually take long flights, but often rest on foliage, suddenly darting away and for a time lost to view: when in a moment they will again be perceived, often resting on the same leaf whence they first took flight. Most Hesperids are very fond of flowers of all kinds, and *Lantana* is here a great favourite with them; some Hesperids whilst feeding rapidly vibrate their wings and appear scarcely to touch the flowers with their tarsi, moving rapidly from one bloom to another much like the Humming-bird hawk-moth. When settled the Hesperids either raise their wings above the body, or raise the forewings above the body and expand the hindwings horizontally—the latter being a characteristic position with these insects.

The larvæ are, most of them, easily distinguishable from other butterfly larvæ; the body is usually thick at the middle, tapering rather rapidly towards each end, the posterior segments rather flattened, the anterior segments very small in diameter so as to form a sort of neck, giving the head great freedom of movement. The lower part of the head (jaws) is usually projected forwards when the larva is at rest on a flat surface, the top of the head sloping backwards from the jaws. The larvæ are generally smooth or sparsely hairy, and mostly very soberly coloured. When just hatched they all seem to be cylindrical, whatever may be their shape later. They live in the rolled-up leaves of their foodplants, or draw a few leaves together with silk to form a shelter; some species (and many very young larvæ) eat away a channel from the edge of the leaf towards the mid-rib at two spots rather farther apart than the length of the larva; the piece between the two channels is then turned over gradually by spinning threads of silk across at intervals, till at last the edge meets the main portion of the leaf, forming a rough tube or shelter, more or less open at the ends. Thin, narrow leaves such as bamboo are usually rolled up helically from the tip, the rolling being performed by degrees and the turns secured with silk as the rolling-up proceeds; the lower end of the tube thus formed is sometimes partly closed but often left open, and the upper end closed by bringing the tube at a sharp angle with the blade of the leaf and fixing it with silk. The larvæ eat away at the open end of the tube till it becomes too short to hide them properly, when they remove to another leaf and twist up a new tube. Generally larvæ which are nearly fullgrown preserve their tubes intact, and eat the neighbouring foliage, retiring into their shelters to rest. A larva just hatched often selects the extreme tip of the leaf, and resting lengthways of the mid-rib it gradually draws up together the halves of the leaf by attaching strands of silk to both edges across the blade—perhaps four or five stitches at intervals for a distance of a little more than the length of the larva. I believe the rapid contraction of the silk draws the leaf up, more than actual muscular strength, at least in the case of very young larvæ. As the leaf-blade slowly folds together, more silk is added to the strands till at last the larva is completely concealed. Those larvæ which live in leaf-tubes appear to make use of but one leaf, unlike the larvæ of several small moths which draw up together several leaves. Hesperid larvæ are, so far as I am aware, not gregarious, but lead solitary lives, each within its own shelter into which it rapidly withdraws at the least sign of danger.

The larvæ pupate within their shelters; some pupæ are attached only by the tip of the abdomen; others in addition are girt round the middle with a band. The cremaster is attached to a group of filaments, often in the form of a Y, spun on to the interior of the shelter; the filaments themselves usually forming part of a loose-textured film of silk spun more or less over the interior of the shelter—an incipient cocoon in fact. The old larval skin is very often not got rid of in Hesperid pupæ, but remains entangled near the cremaster. Both larvæ and pupæ of several species are covered more or less with a white powdery substance like that on many aphides and bugs. The abdominal part of the empty pupal shell of most butterflies contains a little clear liquid after the emergence of the insect, but that of many Hesperids is quite filled with liquid. The internal organs, especially the dorsal vessel and tracheæ, can some of them be seen quite distinctly through the semi-transparent skin of some Hesperid larvæ; and towards the close of the pupal stage the wings in some pupæ can be seen developing. Hesperid larvæ appear to feed chiefly at night.

Some of the commoner species of *Hesperiidæ*, which swarm at certain flowers a great part of the year, seem often to fall victims to lizards, spiders and predaceous flies, and the larvæ of some Skippers are much parasitised by Chalcid flies which lay their eggs on the bodies of the larvæ. The above-mentioned predaceous flies (*Asilidæ*) are usually termed Robber-flies. Two species are very common here during certain months of the wet season—one a very large fly (*Microstylum spectrum*, Wied.) about $1\frac{1}{2}$ inches in length, of a general red-brown colour, coarsely hairy and with long bristly legs and transparent brown iridescent wings. The other species (a *Promachus*) is about an inch in length, the abdomen dark brown, conspicuously banded on each segment with ochreous. Both flies have formidable beaks or probosces, with which if incautiously seized the larger species will draw blood from the hand, causing a smarting wound. These Asilidæ prey on many insects besides Skippers—cicadæ, grasshoppers of various kinds, bugs (even the evil-smelling species) wasps and flies of all sorts—which they seize and bear away to some convenient leaf or twig, where they drive their probosces into their victims and drain the juices from them. Like the dragonflies they occasionally become cannibals and devour one another. Their favourite food here seems to be a rather pretty green cicada with transparent wings, very common in the early summer—a larger insect than the Asilid which attacks it, but then these flies also kill the largest wasps and bees we have here, and instead of dropping their prey if one threatens them with a stick, they fly off with it, generally slowly and only a yard or so away.

Most of the Skippers here may be seen on the wing almost every month except January and February, but they are chiefly numerous in spring and autumn. They scarcely seem to be affected seasonally in colour or pattern, but some of the dark brown, white- or ochreous-spotted species (*Parnara*) vary greatly individually in the size and distinctness of the spots.

The eggs of the *Hesperiidæ* are usually smooth, hemispherical or conical, flat at the base where attached to the plant. They are often parasitised by small Chalcid flies: from one egg of *Notocrypta feisthamelii* taken in October four flies hatched out; they made a small hole in the top of the egg.

Tagiades atticus, *Fabr.*

A pretty and conspicuous species, fairly common at Hongkong, very scarce at Macao. It frequents shady paths and ditches and banks overgrown with long grasses and other rank vegetation. It seemed to be a common insect in some of the patches of wood on the hills at Tam-Chau in Kwangsi, at the junction of the Nanning and West rivers, and also occurred at Lo-fu-shan. This species flies swiftly, but is very noticeable on the wing, the white hindwings appearing in the shadows of the trees like a small white moth rapidly moving amongst the undergrowth—the dark brown forewings not being seen at all unless one is very close to the insect.

Fig. 11, Pl. XIV is from a ♂ taken in April; the sexes, however, are practically alike. This Skipper occurs throughout the wet season and may be taken in October and November.

Odontoptilum sura, *Moore*

Another rather striking species, both in colouring and the curiously angular outline of the wings. It is not an uncommon Hesperid at Hongkong, flying fast but often resting on foliage with expanded wings, the tips sometimes touching the leaf. Like the former Skipper it is fond of wooded localities, and occurs at Lo-fu-shan, but I have never seen it at Macao.

Fig. 3, Pl. XIV is from a ♀ taken in August, but this species is on the wing all through the wet season. The sexes are very much alike.

Caprona alida, *de Nicéville*

This Skipper is rare here: I have only taken two specimens at Hongkong and seen one other. It does not seem quite so swift on the wing as most of its congeners, and appears fond of low, dense herbage. Hongkong island is much more prolific in Hesperiidæ as regards number of species than the Macao district, probably because there is a fair amount of rather dense undergrowth in the ravines and on many of the hillsides at Hongkong, which the Chinese are not allowed to destroy as they please. Most of the Skippers are very fond of haunting paths, drains and nullahs overgrown with rank herbage and shaded by trees, both in dry and wet localities.

Fig. 1, Pl. XIV is from a ♀ taken in April. The sexes are very similar.

Caprona syrichthus, *Felder*

Also a rare insect here, and a conspicuous species even on the wing. I have taken but two or three specimens, all at Kowloon. But at Kwei-hsien in Kwangsi it seemed to be fairly common during July and August, flying swiftly in the sunshine over grassy plains, and feeding at many kinds of flowers growing amidst the long grass. Several specimens were taken one afternoon on the plain with the curious jagged limestone rocks, on the opposite side of the river to Kwei-hsien city. Both species of *Caprona* seem to affect open country.


Fig. 2, Pl. XIV is from a ♂ taken in June. The sexes are very much alike.

Suastus gremius, Fabr.

A very common Skipper here, to be seen almost everywhere, but especially on scrubby waste land and hillsides in the neighbourhood of the foodplant of the larva. The light yellowish-white spots in the forewing vary much in size, but the three spots in the median interspaces are usually large and distinct, especially in the ♀. In the ♂ the small spots on the anterior of the forewing are often much obscured or even wanting. The black spots on the underside of the hindwing are usually five in number, but often they are indistinct and one or two perhaps obsolete; the sexes are very much alike. This Skipper has a rather swift flight, but spends much of its time resting with half-open wings on foliage.

Fig. 25, Pl. XIV is from a ♀ taken in November, but this species is on the wing more or less almost throughout the year.

Egg, sub-conical, with a small flat circular top, the body strongly ribbed axially with many ragged-edged ridges; of a general dull yellowish, the ridges paler. Later on the egg becomes dark purplish, the ridges white. Laid singly on either side of leaves of *Phoenix hanceana*, Naudin, Nat. Ord. *Palmæ*, the foodplant of the larva, a spiky, stiff-leaved small palm common to S. China, including Formosa and Hainan.

Larva, just hatched, dark red, head reddish-yellow. Fullgrown, smooth or very finely wrinkled transversely, general colour greenish-yellow. A well-defined dark dorsal longitudinal line. The last segment with two darker patches of greenish-yellow, one each side of the dorsal line, edged round with lighter colour, but the patches are rather indistinct. Head black, divided down the centre of the face by a broad white stripe, itself centred by a dusky line. Sides of the head white edged with black. Underside, legs and prolegs greenish-yellow. The very young larva cuts two channels in one side of a leaf blade towards the mid-rib, where the channels are brought closer together, and the small piece of leaf thus hinged, as it were, is easily turned over on to the blade in spite of the stiff and harsh nature of the leaves of this palm, thus forming a shelter.* (See figure on Pl. VIIa.) The larva pupates either between two leaves brought close together—at one part and secured with silk, or a piece of leaf is nearly cut off and turned over on to the main portion, forming a rough tube of this section . Sometimes a few threads of silk make a slight network over the openings at either end of this shelter, but the ends are always brought fairly close together.

Pupa, smooth, of a general yellowish-white, slightly dusted over with a white powder. Attached by the tip of the abdomen only.

* Several small spiders construct shelters from leaves in much the same manner.

Iambrix salsala, Moore

A fairly common Skipper on some parts of Hongkong island, but it does not seem to occur on the Kowloon side, nor at Macao. It is common in places in the woods at How-lik, frequenting grass and low herbage in damp places under trees. It also occurs at Lo-fu-shan. It has not a particularly fast flight, and constantly returns to special leaves and sprays on which it rests, never seeming to wander very far. The sexes are much alike.

Fig. 9, Pl. XIV is from a ♀ taken in May, but this Hesperid is to be found all through the wet season, and late in the autumn.

Hyarotis adrastus, Cram.

This species is common at Hongkong in some places, but I have not observed it at Macao. On the wing it may easily be mistaken for *Notocrypta feisthamelii*. It has a rapid flight but often rests on foliage, stones, etc., and sometimes returns again and again to the same spot. Like many other Hesperids it has a predilection for settling on bird-droppings and sucking moisture therefrom, and is often deceived by other small whitish substances. *Hyarotis adrastus* is common by the side of the stream running through the woods at How-lik.

Fig. 4, Pl. XIV is from a ♂ taken in May, but this species occurs throughout the wet season and late into the autumn. The sexes are very similar.

Matapa aria, Moore

This seems to be a very common Hesperid over most of Kwangtung, occurring in numbers in almost every little wood when bamboo is growing anywhere near. Its plain and sombre colouring is relieved by the beautiful crimson eyes, which retain a certain amount of colour for some months after death. The flight of this species is not quite so rapid as that of most Skippers; though it is to be seen feeding at flowers in hot sunshine it prefers undergrowth beneath the shade of trees.

Fig. 24, Pl. XIV is from a ♀ taken in May, but it is to be found on the wing almost throughout the year. The sexes are practically alike, but the ♂ occasionally has a whitish brand across the interspace between the median nervule and sub-median nervule of the forewing, as in the ♂ of *Parnara mathias*.

Egg, hemispherical, smooth, whitish; laid singly either side of the leaves of scrub bamboo, the foodplant of the larva.

* Larva, very young, smooth and shiny, reddish changing to greenish near the head. Head black. Later, general colour greenish, the second segment rather swollen and yellow. Fullgrown, almost cylindrical instead of the usual fusiform type; of a general chalky yellowish-white. The spiracles marked in black, the last spiracle boldly marked in black. A thin transverse

* The Larva of *Matapa aria* is parasitised by a Chalcid fly: see under *Telicota augias*.

black line on the back of the second segment; legs and prolegs greenish-white. Head waxy yellow. The larva rolls up a bamboo leaf helically with two or three turns, and lives within the tube thus formed (*See figure on Pl. VIIa.*) The larva is figured fullgrown on Pl. 4a, Fig. 21.

Pupa, smooth, cylindrical, of a pale and shiny yellowish or ochreous, the front of the head dark brown or blackish just over the palpi and partly over the eyes. Enclosed in a twisted-up leaf-tube. Attached by the tip of the abdomen only, the inside of the tube being lined with a very slight film of silk. The head of the pupa is usually, but not invariably, towards the closed or upper end of the tube. If touched or otherwise annoyed the pupa can (like some other Hesperid pupæ) vibrate rapidly, striking the head and anterior parts against the sides of the leaf-tube, and producing a sound which can be heard distinctly at the distance of a yard or more. The larva, also, when disturbed jerks the head and anterior part of the body with a rapping motion. For a day or two previous to emergence the pupa remains yellowish-white, but the crimson eyes show very plainly through the pupal shell.

Erionota thrax, Linn.

The largest Hesperid here, and a very common insect wherever there are banana plants, but it seldom flies much during the day, and thus escapes notice. It becomes very active about dusk, flying at great speed about the tops of bananas and other foliage. Occasionally it rests from its wild gyrations on the tip of a leaf, when a mate will often suddenly appear and both will dart off together. I have captured this insect at flowers as late as 9 p.m., and it probably flies much later if the night is propitious.

Fig. 6, Pl. XIV is from a ♀ taken in September, but it is on the wing throughout the wet season, though most plentiful in the autumn. The sexes are very similar. The eyes are crimson.

Egg, hemispherical but rather flat-topped, the underside broad and flat. Body of the egg with many very shallow flutings running axially; general colour rather dark yellow, the ridges of the flutings pale yellow, the flat top dark yellow. Later, the general colour is dirty white, the top crimson, and a crimson line encircles the body of the egg about mid-height. Laid either singly or more generally in batches of three to a dozen or rather more, on either side of leaves of the banana, *Musa sapientum*, L., Nat. Ord. *Scitamineæ*, the foodplant of the larva.

Larva, just hatched, yellowish, head black. Fullgrown, subulate, much narrowed towards the head; of a general greenish-white, wrinkled transversely on the body, and with a few short whitish hairs on the dorsal surface; the body covered with a white flocculent substance, thick in places, giving the larva a rough appearance. When this powder is cleaned off an indistinct dorsal band is seen, due to an internal organ (dorsal vessel or heart) showing through the semi-transparent skin. The larva lives in rolled-up tubes made from a portion of the banana-leaf, stitched up the side and around the top, open at the bottom.

Pupa (Pl. VIa, Fig. 11) smooth, cylindrical, yellowish-white, covered with a flocculent white powder, which is also profusely dusted over the interior of the leaf-tube. Fixed by the tip of the abdomen without a girdle, inside a rolled-up leaf, the lower opening of which is usually slightly secured with silk, as well as the upper end. As will be seen from the figure, the proboscis is contained in a chitinous sheath separated from the body of the pupa, much as it is in the pupæ of the Hawk-moths or *Sphingidæ*. This is also the case with many other Hesperid pupæ.

Taractrocera atropunctata, Watson

A pretty little black-and-yellow Skipper, common in most parts of Kwangtung, fond of grassy hillsides and open waste ground. It flies in bright sunshine and the ♀ often lays her eggs during the hottest part of the day. It is fond of the small flowers growing amongst long grass, and flies jerkily and fairly fast, but haunts the same locality day after day, resting often on grass-stems and flowers with half-open wings. The abdomen of this species is black on the upperside and distinctly ringed with yellow on each segment. The ♂ has a tuft of rather long black hairs springing from the costal margin of the hindwing at the base, and several other Hesperids have the hairs at this point more or less produced in both sexes, but chiefly in the males; these hairs probably act somewhat as the "frenulum" in moths—forming a connection or co-adaptation between the fore- and hindwing. The sexes of *Taractrocera atropunctata* are very similar in marking and colouring, though this Skipper varies much in dimensions and also in the size of the yellow markings on the wings.

Fig. 21, Pl. XIV is from a ♂ taken in August, but it is on the wing throughout the wet season.

Egg, hemispherical, smooth, yellowish-white, large for the size of the insect; laid singly on grass-blades. The foodplants of the larva are several species of rather coarse grasses.

Larva, just hatched, white with a black head. Fullgrown, of a uniform pale yellowish-green. Head black. The young larvæ draw the edges of a blade of grass together with a few stitches of silk; later on they sometimes twist the blade into a tube.

Pupa, smooth, pale yellowish, greenish near the head. Fixed inside a leaf-tube by the tip of the abdomen, without a band.

Ampittia maro, Fabr.

Fairly common almost throughout the year in many parts of Kwangtung, but rather local, frequenting damp places where there is a growth of long grass, rushes and other rank herbage. It is active all day long, but does not appear to wander very far, and has not a very strong flight: every now and then resting on the small flowers at which it feeds, or on stalks of low vegetation. It seems to be the smallest species of Skipper found here. The sexes are very similar, and this insect does not seem to vary much in size; the ♂ has a rather larger expanse of yellow on the upperside of the forewing, which in the ♀ tends to be divided into spots of yellow separated by the dark brown ground colour.

Fig. 18, Pl. XIV is from a ♂ taken in August, and it seems to be most numerous in spring and autumn. Fig. 6, Pl. VIIa is the upperside of a ♀, the sexes being much alike in colouring. *Ampittia maro* and *Padraona dara* are easily distinguished by the patterns of the wings from *Taractrocera atropunctata*, but the latter can at once be separated by the clubs of the antennæ, which are more or less thin and spatulate, scarcely if at all hooked; whereas the two former species have the clubs elongate and of round section, gently curved at the tips into a crook.

Parnara guttatus, Bremer and Grey

A very common species here, and one which does not seem to vary much in the size and distinctness of the spots in both wings; but the uppermost of the three sub-apical spots and the lower of the two spots at the outer end of the disc. cell are sometimes wanting. The insect varies in dimensions, but the spots on the underside of the hindwings in both sexes are large and silvery-white, close together and fairly regular, and these spots and the rather angular outline of the wings distinguish it at once from other Hesperids here which resemble this species in colour and markings. Three, often four, of the spots in the hindwing show distinctly on the upperside, of a pale ochreous white. *P. guttatus* is on the wing in more or less numbers the greater part of the year, though chiefly numerous in the autumn, and frequents foliage, long grass and flowers; it is very fond of Lantana and the clustered whitish flowers of *Eugenia Jambolana*, which also attract many other insects. This Skipper has a very swift flight, but constantly rests with half-open wings on flowers and leaves. Commander Walker found it common in the Chusan islands. It was exceedingly common during October at a height of 4,000 ft. on Lo-fou-shan. One individual lit on my hand and remained for at least a minute, bending the tip of its abdomen as if about to lay an egg, but it deposited drops of clear liquid which it eagerly sipped with its proboscis. It exuded several drops in different spots, and immediately sucked them dry. This and other Hesperids may occasionally be observed depositing liquid on leaves and drinking it up.

Fig. 26, Pl. XIV is from a ♂ taken in April, but the sexes are alike.

Egg, sub-conical, smooth, pale greenish just laid: afterwards brownish or ochreous. Laid singly on leaves of apparently any low vegetation, often on grass-blades, but my larvæ would only eat scrub bamboo.

Larva, just hatched, whitish with a black head. Nearly fullgrown, fusiform, pale yellowish-green, finely irrorated with dark green or dusky; the whole body on the upperside slightly sprinkled with very minute stubble; a dark green or dusky median dorsal band; a light yellow-green, rather indistinct lateral stripe each side, bordered irregularly on both edges with dark greenish. A whitish, indistinct line along the spiracles each side, due to the tracheæ showing through the skin. Last segment pale yellow-brown, with a few short whitish hairs. Underside and legs pale greenish. Head oblong, rounded at top, pale ochreous, bordered slightly down the sides with brown which broadens into a darker brown spot at the ocelli. A broad dark brown stripe down

the suture, splitting into a Y lower down, and with two other markings forming an inverted M. A brown patch just above the jaws, and above this an inverted V-shaped brown marking coinciding with the M.

Parnara mathias, Fabr.

Also known as *Chapra mathias*. Figs. 1 and 1a, Pl. VIIa ♂ and genitalia. Upperside dark olive brown. Eight hyaline ochreous spots on the forewing, and between the lowest spot and sub-median nervure an oblique pale ochreous streak or brand, sometimes very distinct, often obscure. The scales forming this brand are not identical with the ordinary wing scales, but seem to be of the nature of androconia. Hindwings immaculate. Underside similar to the upperside except that the position of the brand is indicated by a broad and indistinct light marking or patch. Hindwings with four or five small pale ochreous spots irregularly placed: sometimes these spots are almost obsolete. The ♀ is like the ♂, but the brand in the forewing is replaced by two spots, the upper one very small. The spots on the underside of the hindwing are larger and more distinct than in the ♂, and often show on the upperside as well, more or less distinctly. On the underside they are generally whitish. Expanse 1.25—1.625.

This is one of the commonest Skippers here, and is on the wing throughout the year, though scarce in January and February. In the spring and autumn, together with *P. colaca*, it swarms at Lantana and many other flowers and is sometimes captured by lizards. It visits garden flowers, and creeps within the deep bells of the purple *Ipomœa*. I have often seen this Skipper fly slowly away from flowers and suddenly drop to the ground, and on picking it up discovered the small ambush-spider clinging to it, generally by the head. The Asilid flies also destroy numbers of this Hesperid, picking them up as they rest on a leaf or are intent on probing a flower. *P. mathias* is abroad all day and seems to delight in hot sunshine. It is practically ubiquitous, and may be found wherever there is a little scrub or long grass, but it prefers open country.

Forsyth, in the Trans. Ent. Soc. Lond. for 1884, p. 387, describes the larva and pupa thus:—

“Larva. Head triangular, on a neck; a brown line along the margin of head. Body grass-green, with light yellow bars across back. A whitish line along either side above the origin of legs. Found on long, coarse, green meadow-grass in August.”

“Pupa. Along a blade of grass, attached by a band across thorax and also at tail. Head generally points upwards. Body of a translucent green colour, quite naked, and unenclosed in a covering of any description.”

Parnara sinensis, Mabille

Not a very common species here; it appears to be allied to *P. mathias*, and occurs rather sparingly almost throughout the year, often in company with the latter Hesperid. It frequents open, scrubby ground and the outskirts of woods amongst long grass.

Fig. 2, Pl. Va is from a ♂ taken in June. In the ♀ the oblique whitish streak or brand in the forewing of the ♂ is replaced by two spots, the uppermost very small and often wanting altogether; otherwise the sexes are alike. The chief external difference between *P. sinensis* and *P. mathias* is that in the former species the spots on the underside of the hindwing are large, sub-circular and distinctly white; on the upperside they are more or less distinct in both ♂ and ♀, and of a pale ochreous. The genitalia of these two species are quite distinct.

Parnara bromus, *Leech*

Figs. 2 and 2a, Pl. VIIa, ♂ and genitalia. Upperside dark olive brown. Forewings with ten hyaline ochreous spots, but often the very small spot (shown in the figure) just above the spot against the sub-median nervure is wanting. Underside similar to upper surface, but paler. Hindwings immaculate on the upperside, sometimes also on the underside, but usually with one or two small pale ochreous spots in the median interspaces. Both sexes alike, but the ♀ is generally the larger. Expanse 1.5—1.75.

This Skipper is not uncommon here throughout the wet season, chiefly frequenting the neighbourhood of the foodplant of the larva, a large reed often growing in the hedges of Chinese gardens or alongside paths, which attains ten or twelve feet in height, with a thick stem. *P. bromus* seems to be chiefly crepuscular, and the ♀ lays her eggs in the evening on leaves of *Phragmites Roxburghii*, Kunth, Nat. Ord. *Gramineæ*, the foodplant of the larva, a reed common to all the warmer parts of Asia.

Egg, sub-conical, smooth, greenish at first: afterwards ochreous. Laid singly on leaves of the reed.

Larva, just hatched, white with a large black head. Fullgrown, fusiform, general colour light yellow-green, finely irrorated with dusky or dark green. One dorsal and two lateral indistinct bands each side of darker greenish. Posterior segment flattened, whitish. Underside glaucous green. Head dull ochreous, sometimes marked rather distinctly down the centre and each side of the face with brownish.

Pupa, smooth, produced into a beak at the head, the tip of the abdomen beaked and flattened. General colour light hyaline green, whitish towards each end, and with two indistinct dorsal whitish lines. Attached by the tip of the abdomen and a band round the middle. The pupa is placed in the hollow of a leaf of the reed, caught up with a stitch of silk at each end of the pupa, which is not hidden from view. It is usually slightly dusted with a whitish powder. The larva does not twist up a leaf helically, but draws the edges together with silk to form a shelter.

Parnara colaca, *Moore*

Fig. 27, Pl. XIV, ♂. From a single specimen identified by Mr. H. H. Druce as *P. colaca*. It agrees both with the figure and description of *P. thyone*, Leech; which Leech says is allied to *P. colaca* and *P. beavani*, Moore. The specimen was taken at Hongkong.

Figs. 3 and 3a, Pl. VIIa, ♂ and genitalia. Upperside dark olive brown. Seven to ten hyaline ochreous spots on the forewing: seven are shown in the figure. The extra spots are very small and occur as follows:—One or two in the outer end of the disc. cell; one just above the spot against the sub-median nervure. Of these three spots any or all may be present or wanting. Underside similar to upperside, but paler; a series of two to five small irregularly placed ochreous-white spots on the underside of the hindwing, but some (occasionally all) of these spots may be wanting. Upperside of hindwing generally immaculate, but sometimes one or two spots show faintly. Sexes alike. Expanse 1.25—1.5. Those specimens with seven spots in the forewing agree with Moore's description of *P. colaca*.

This Skipper is fairly common here, and on the wing the greater part of the year. The ♀ appears to be commoner than the ♂. It flies all day and seems to like hot sunshine, frequenting hedgerows, scrub and long grass and is fond of flowers.

Egg, sub-conical, smooth, greenish-white, laid singly on blades of grass of several coarse species, the foodplants of the larva, which draws the edges of a blade together with silk to form a shelter.

Larva, just hatched, white with a black head. Fullgrown, fusiform, general colour very pale whitish-green; one rather broad dorsal band of darker colour bordered each side by a whitish line; one lateral whitish line each side, about midway between the dorsal band and the underside. Underside, legs and prolegs greenish. Head pale grayish-green, with a broad triangulate darker patch down the middle of the face, the apex near the top of the head; a blackish line down each side of the face.

Pupa, smooth, the head produced into a beak; of a hyaline green, sometimes rather bright, with a dorsal band and lateral whitish lines along the abdomen, as in the larva. Attached by the tip of the abdomen with a girdle round the middle. The blade of grass in which the larva pupates is caught up with a stitch of silk before and behind the pupa, but the latter is not entirely concealed.

Figs. 4 and 4a, Pl. VIIa, ♂ and genitalia. Upperside dark olive brown. Five to six hyaline ochreous spots on the forewing, the extra spot being the uppermost of the three sub-apical spots shown in the figure, but it is very often absent. There are no spots in the sub-median interspace. From one to four pale ochreous-white spots (usually three) are as a rule distinct on the upperside of the hindwing, but occasionally they are practically obsolete. Underside the same, the spots usually whitish. Sexes alike. Expanse 1.25—1.5. Those specimens with five spots in the forewing agree with Leech's figure of *P. colaca* in his "Butterflies from China, Japan and Corea." Habits like the preceding Skipper, but it is much more common.

I must admit being unable to unravel the tangle that exists between *P. colaca*, *P. thyone* and *P. beavani* and their near allies. In the hope of arriving at some definite conclusion Mr. F. Muir and I examined the genitalia of a great number of the species figured at Fig. 3 and Fig. 4 on Pl. VIIa, and we find a distinct and constant difference exists in the

genitalia of these two Skippers, and have no doubt whatever that they are distinct species; but until the genitalia of other allied species have been worked out it is useless to give a new specific name. The species Fig. 4 on Pl. VIIa, is as common here as *P. mathias*, and often swarms in the autumn. The chief external difference between the two species shown at Figs. 3 and 4 on Pl. VIIa, is that Fig. 4 has no spots in the sub-median interspace, and the upperside of the hindwing has the spots usually quite distinct; Fig. 3 has a spot in the sub-median interspace, and if any spots show on the upperside of the hindwing they are not more than two in number and are very obscure.

Baoris assamensis, de Nicév.

This fine Skipper is not uncommon here during the wet season and on into late autumn. I found it common at Wuchow during July, frequenting flowers in the late afternoon and evening. It flies very swiftly and does not linger at a flower more than a few moments, feeding almost like a Hawk-moth, and producing a humming sound with its wild rush through the air. This Hesperid varies slightly in the distinctness of the spots on the wings, but usually they are almost white and well defined. It seems to be a decidedly crepuscular species, and in this district frequents *Lantana* flowers.

Fig. 5, Pl. XIV is from a ♂ taken in August, but the sexes are very similar.

Baoris oceia, Hewitson

A fairly common species here, and on the wing practically throughout the year. It is, however, easily confused with other Hesperids unless closely examined. It frequents the undergrowth beneath trees, and shady gardens, and is attracted by *Lantana* and other flowers. It flies rather swiftly but apparently does not usually wander very far, and like many other Hesperids often rests with semi-closed wings on leaves and twigs, whence it darts away on excursions, returning very often to the same perch. The sexes are almost identical in colour and marking, but the ♂ has a tuft of long dark brown shining hairs springing from the disc. cell on the upperside of the hindwing, and is easily recognised thereby.

Fig. 8, Pl. XIV is from a ♂ taken in February. *Baoris oceia* varies slightly in the number or distinctness of the spots in the forewing: often there are only two instead of three small sub-apical spots close together; sometimes there is a small but distinct spot in the median interspace close to the sub-median nerve. There are no spots in the hindwings of either sex.

Larva, when young of a pale yellowish-green, whitish towards the last segments. Second segment yellowish-white. Head small and black. Fullgrown, smooth or in places finely wrinkled transversely, general colour yellowish-green whitish towards the last segments, and with a lateral band of whitish each side, just above the prolegs. Underside glaucous green; legs and prolegs greenish-white. Head large and whitish, ringed with black round the edge, which broadens on the sides of the face near the jaws. Suture marked broadly with black down the upper part of the face; a triangle just over the jaws formed by thin, double black lines, with one short central line.

A broad black marking down each side of the upper part of the face. The head is very boldly marked in the fullgrown larva, but in its younger stages and up to about mid-growth the larva has the head small and uniform black, the sudden change in size and markings being very striking. The larva feeds on bamboo, rolling up the leaves into tubes in the usual manner.

Pupa, smooth, head produced into a beak; of a general pale green; fixed by the tip of the abdomen with a band round the middle, in a bamboo leaf the edges of which are partly drawn together with two or three stitches across at intervals, but leaving the pupa more or less exposed to view.

Baoris pellucida, *Murray*

This Skipper is not common here, but is very liable to be confused with other species, even when carefully examined, and it may perhaps be of more frequent occurrence than is supposed. The spots on the underside of the hindwing of this species usually show more or less distinctly on the upperside. It has a rapid flight, but often rests for a long time on foliage amongst thick vegetation, usually frequenting shady spots in gardens and wooded districts, and not seeming particularly fond of flowers.

Fig. 12, Pl. XIV is from a ♀ taken in July, but it seems to be on the wing most of the year. The sexes are practically alike. The spots on the wings are not white, but pale hyaline ochreous.

Padraona dara, *Kollar*

This little black-and-yellow Hesperid is very common here, and also over most of Kwangtung. It haunts tall grass, undergrowth, bamboo scrub and the outskirts of woods, and is very partial to the flowers of many small herbs and shrubs. It has a fairly rapid flight but seldom strays very far, often resting on leaves and flowers for a long time with partially-open wings. It flies all through the day and seems to enjoy sunshine and shade equally. The sexes are very much alike, but the yellow marginal and apical markings in the forewing upperside of the ♀ are smaller than in the ♂ and the nervules dividing them rather broadly marked in black; there is a yellow marking in the disc. cell, but otherwise the rest of the forewing is deep brown. In the hindwing upperside the yellow spot in the disc. cell is wanting or very nearly obsolete. On the underside the sexes are almost alike.

Fig. 22, Pl. XIV is from a ♂ taken in August, but it is more or less on the wing all the year round.

Egg, hemispherical, smooth, yellowish-white, and appears to be usually laid singly on grass-blades, but the larva feeds on bamboo, though it may also feed on some species of grass.

Larva, just hatched, smooth, white, head shiny black. A thin transverse black line on the back of the second segment. A few whitish hairs on posterior segments. Fullgrown, fusiform and rather long and slender; general colour light yellowish-green, the last segment greenish and bearing a few short whitish hairs. A distinct median dorsal dark line, due to the dorsal vessel seen through the skin. Body alternately smooth and striated transversely. An

indistinct whitish lateral line each side along the spiracles, due to the tracheæ showing through the skin. Legs pale yellowish. Underside and prolegs greenish. Head oblong, dark red-brown, with a broad white stripe down each side of the face, and an indistinct whitish spot just above the jaws.

Telicota augias, Linn.

A very common Skipper here, found wherever there are clumps of scrub bamboo, and very fond of Lantana flowers. It is more or less on the wing in every month, but is most numerous in the autumn. It flies swiftly and erratically, but haunts a particular retreat for a long time, and is active all day long, seeming rather to prefer a hot sun. Both sexes vary considerably in dimensions. This Hesperid is often seized (usually by the head) by a small white or pale yellow compactly-built spider, which spins no web, but lies in wait with its legs neatly tucked up out of sight on a flower. With some flowers it harmonises beautifully and is very hard to detect. Sometimes it seizes the Skipper by the proboscis and drags it away thus.

Fig. 28, Pl. XIV is from a ♂ taken in November, but this Skipper occurs every month in the year. The ♀ is easily distinguished from the ♂ by its much less extent of yellow (also of a paler tint) on the upperside of the forewing. It has the sub-marginal and apical yellow spots as in the ♂, but smaller; the rest of the forewing is dark brown, except for a rather large yellow spot at the outer end of the disc. cell, and an indistinct streak of yellow just above the costal nervure. In the hindwing the spot of yellow is wanting in the disc. cell, though there are yellow hairs there. On the underside the sexes are very much alike. Fig. 5, Pl. VIIa is the upperside of a ♀.

Egg, hemispherical, smooth, whitish; laid singly either side of bamboo leaves, the food-plant of the larva.

Larva, just hatched, yellowish-white, head black. Later, smooth, greenish; head dull yellowish, an inverted V-shaped brownish marking down the face; the two last segments yellowish with a darker transverse dorsal marking. Fullgrown, smooth, of a uniform greenish-yellow, a black T-shaped marking on the back of the last segment; head yellow, slightly edged round with black, and a blackish bar down the centre of the face, widening over the jaws. The heart or dorsal vessel in these semi-transparent larvæ can be seen pulsating very distinctly. It is a long thin tube just under the skin of the back in the median line of the larva, extending almost from head to anus. The tracheæ or branching air-tubes connecting with the spiracles can also be observed, ramifying in all directions like white rootlets. The larva when very young spins a few strands of silk across the tip of a leaf, thus drawing up the edges and forming a trough in which it lies. Later on it twists a leaf helically into a tube in the usual manner.

Pupa, smooth, yellowish-brown, darker on the anterior segments. Slightly dusted with white powder. Attached by the tip of the abdomen only. The larva pupates within a leaf-tube, lining it more or less completely with a very thin and loose-textured film of silk. The pupa has the power of setting-up rapid vibratory movements if disturbed, as in the case of the pupa of *Matapa aria*.

The larvæ of *Telicota augias* and *Matapa aria* are both very frequently attacked by species of the parasitic Chalcids, which lay their eggs externally all over the back of the larva. The eggs are grayish-white and very shiny, semi-transparent, long-shaped and rounded at the ends, attached either by one end or laid on the side; twelve to fifteen eggs seems to be the usual number laid on one half-grown larva. The eggs hatch in about two days (in the wet season) the larvæ being dark gray rather shiny-looking or slug-like creatures, which feed externally on the host larva. The latter very soon dies and the Chalcid larvæ pupate in about a week or ten days from the time of hatching. The pupæ are shiny dark yellow, attached to the back of the dead host larva or on the leaf near by; the flies (tiny, clear-winged and black-bodied insects) emerge in about five—seven days, the pupæ previously turning black. The Chalcid larvæ suck the juices of their victim without making any apparent wound in the skin.

Udaspes folus, Cram.

This large and very conspicuous Hesperid is common here, flying all day, often in bright sunshine, but rather more active in the early morning and evening. It is on the wing during the greater part of the year, and occurs almost everywhere, but especially haunts the damp localities where the foodplant of the larva grows, the banks of streams overgrown with vegetation, and marshy, jungly tracts on the hill-sides. It is rather a wandering insect, with a fast, erratic flight and is fond of some kinds of flowers, amongst which is the large purple convolvulus *Ipomœa palmata*, Forsk, which grows so abundantly here.

Fig. 20, Pl. XIV is from a ♀ taken in August, and it is most numerous in the autumn. The sexes are alike.

Egg, smooth, sub-conical, broadly rounded at the top, with a thin, slightly milled rim around the broad flat base. Just laid, of a general dark red or claret colour; later, blotched with pale yellowish. Laid singly on either side of leaves of the foodplant of the larva, *Alpinia nutans*, Rosc., Nat. Ord. *Scitamineæ*, a very common species of lily here, and found in all the warmer parts of Asia.

Larva, just hatched, of a general orange colour, the head black. Fullgrown, dull dark greenish; a broad, indistinct darker dorsal band due to internal organs showing through the skin; a whitish patch each side of this band on the penultimate segment, due to the mass of tracheæ showing through the skin; last segment dull yellowish. Spiracles whitish, connected by a lateral whitish band, due to the tracheal tubes showing through. Underside pale greenish; legs and prolegs yellowish-white. The anterior articulations of the segments are indistinctly marked with ochreous. Head notched at the apex, black. The male larvæ (apparently) have two small egg-like, light yellow organs, one on each side of the dorsal vessel, on the ninth segment, which separate and close together according to the pulsations of the dorsal vessel. These organs appear in the pupa to coalesce into one sub-circular yellowish organ; they are, perhaps, the testes.

Pupa, smooth, produced into a beak at the head; yellowish-white, the proboscis protected by a sheath separate from the body shell. Attached by the tip of the abdomen with a band round the middle, in a fold of a leaf caught up with a stitch of silk at each end of the pupa, which is not entirely concealed.

Halpe moorei, *Watson*

Not a common species at Hongkong, and I have not taken it at Macao, but found it fairly numerous in the woods at How-lik during July; it is, however, to be found throughout the wet season. It has a swift flight and the usual Hesperid habits, and is fond of some flowers, especially those of *Lantana*.

Fig. 7, Pl. XIV is from a ♂ taken in July, but the sexes scarcely differ.

Astictopterus henrici, *Holland*

This little Hesperid is common in some parts of Hongkong island, amongst long grass and herbage by the side of streams and in marshy places shaded by trees, but it does not seem to occur near Macao. I found it common amongst the grass under the trees by the stream-side at How-lik, on the lower levels, during July and August, but it may be found all through the wet season. It flies rather weakly and seldom far from the ground, often resting on grass-stalks, and is on the wing all day in shady places. This small Skipper seems closely allied to *Kerana diocles*.

Fig. 10, Pl. XIV is from a ♀ taken in August. The sexes differ but very slightly.

Kerana diocles, *Moore*

This large and sombre-coloured species is fairly common though local in the district round Macao, where it frequents the banks of shady streams and marshy spots on the hill slopes, and the small rills overgrown with rank vegetation descending from the hills, where the foodplant of the larva grows abundantly. It has rather a slow flight for a Hesperid, and usually flies not far from the ground, often resting on leaves and haunting the same spot for some time. It is on the wing all through the day, especially in shady localities, and does not seem much attracted by flowers, though it feeds at the purple convolvulus sometimes, and is partial to the moisture of bird-excrements. *Kerana diocles* is also common at many places up the West River, at least as far as Wuchow. It may be found throughout the wet season, but is most numerous in spring and autumn.

Fig. 15, Pl. XIV is from a ♀ taken in October. The sexes are practically alike but the ♀ is usually larger and rather lighter in colour than the ♂, which is of a sooty-black.

The eggs of this Skipper are laid singly on either side of leaves of *Alpinia nutans*, and are much parasitised by Chalcids.

The larva and pupa scarcely differ, except in being somewhat larger, from those of *Notocrypta feisthamelii*, and the habits of the larva are the same. The pupa, however, has not

the small dark spot on the abdominal segments which are present in the pupa of *Notocrypta*. The proboscis is encased in a chitinous tube separate from the body, as in the case of *Erionota thrax*, etc.

Notocrypta feisthamelii, *Boisd.*

Form *restricta*, Moore. Common in the same localities as the foregoing species, but it seems to be of more wandering habits, and is found in many places with plenty of foliage and shade. It is swift and erratic in flight, but often rests on leaves, and is also attracted by the droppings of birds. It does not seem to frequent flowers much, though it is sometimes to be seen feeding at Lantana. This Skipper occurs throughout the wet season; it is very liable to be confounded on the wing with *Hyarotis adrastus*.

Fig. 23, Pl. XIV is from a ♂ taken in July. The sexes are much alike: the small subapical white spots in the forewing are sometimes almost obsolete.

Larva, fullgrown, general colour dull pale greenish, yellowish at the articulation of the segments, the whole upper surface finely irrorated with black. Underside pale greenish, legs greenish-white. Head small, very dark brown, with four rather indistinct ochreous markings, two on each side of the face. Larva very stout at the middle of the body, rapidly tapering to the head and last segment, which is depressed. It feeds on *Alpinia nutans*, tubing pieces of the leaf lengthwise and securing with a few stitches of silk. Just before pupation the larva changes to a light semi-transparent green.

Pupa, cylindrical, smooth, produced into a beak at head and tail; of a general pale hyaline green, with five or more small dusky spots in line down the centre of the abdominal segments, one spot in each segment close to the articulation; the pupa covered more or less with a white flocculent powder. Fixed inside a leaf-tube, or a leaf with the edges partly drawn together with a few strands of silk. Attached by the tip of the abdomen, with a girdle round the middle.

The larva is figured on Pl. 4a, Fig. 19, pupa Fig. 20.

Hasora badra, *Moore*

This fine Hesperid is not uncommon here in the autumn, frequenting Lantana and other flowers, usually late in the afternoon and evening. It flies swiftly, but spends much time in feeding, though it lingers scarcely a moment at each blossom, flying from one to another very much like the Humming-bird hawk-moth. The underside of the wings have peculiar purplish and coppery tints. As shown in the figures, the sexes differ considerably in the markings of the forewings. This Skipper occurs at Tam-chau, How-lik, Lo-fou-shan and probably most districts of Kwangtung and Kwangsi where there is any wood.

Fig. 13, Pl. XIV is from a ♀; Fig. 14 of the same plate from a ♂, both taken in November.

Hasora chromus, Cram.

A not uncommon Skipper during the wet season, perhaps most numerous in the spring months, April and May. It is on the wing throughout the day, and frequents the flowers of certain trees and shrubs, including *Eugenia Jambolana* and Lantana, and sometimes the tubular whitish flowers of the Papaya or Papaw. It has a rather swift flight, but whilst feeding often rests on the flowers for a long time, and is not in such a hurry to move on as the former species. The sexes are much alike, but in the ♂ the two yellowish spots in the forewing are often much obscured or even obsolete, and are always much smaller than in the ♀. The ♂ is usually much less in size than the ♀.

Fig. 17, Pl. XIV, is from a ♀ taken in May.

Badamia exclamationis, Fabr.

Easily recognised by its narrow, pointed forewings, the angular outline of the hindwings, and the abdomen distinctly ringed with yellowish-white. This species is fairly common during the wet season, seeming to be most numerous in June and July, but it is local. It has a strong and erratic flight but is exceedingly fond of resting on the underside of leaves, where it often remains quiescent for a considerable time. It very seldom settles on the upperside of a leaf, except for a moment. It frequents woods and foliage, and flies throughout the day in shaded localities. The sexes are much alike, but spots in the forewing of the ♂ are smaller and indistinct, sometimes almost obsolete. The ♀ is generally larger than the ♂.

Fig. 19, Pl. XIV is from a ♀ taken in June.

Ismene ataphus, Watson

This handsome Skipper is not common here, but the larvæ may often be found in fair numbers in some localities near Macao. It seems fond of flowers, especially Lantana and certain flowering shrubs, and usually flies late in the afternoon, though it is occasionally to be seen abroad in the morning in a bright sun. Its flight is swift, but it rather lingers over flowers when feeding, and haunts wooded districts, occurring at How-lik and Lo-fou-shan. It is on the wing all through the wet season, but chiefly appears in the autumn, especially during October. This Hesperid (and some other scarce butterflies) would probably be common but for the depredations of *Cuculus micropterus* and other species of Cuckoo during the wet season here, which destroy great numbers of the larvæ. I have often shot Cuckoos which had the heads of several larvæ of this Hesperid in their stomachs. The ♂ and ♀ differ considerably on the underside, as may be seen from the figures, and the hindwing of the ♀ is almost produced into a "tail" at the anal angle. On the upperside the sexes are more alike, but the ♂ is chiefly bronze-brown, greenish at the base of the wings and on the thorax; the ♀ is light iridescent greenish in the middle and at the base of the wings, the margins bordered broadly with dark colour merging into the lighter tints in

the centre; the whole upper surface showing green and purple reflections in different lights. The orange and black marking on the underside of the hindwing appears much the same on the upperside.

Fig. 16, Pl. XIV is from a ♂ taken in June; Fig. 29 of the same plate is the underside of a ♀ taken in May.

The larva, unlike the majority of Hesperid larvæ, is very brightly coloured and strikingly marked with yellow, black and red. It is figured on Pl. 4a, Fig. 17, pupa Fig. 18. The larva feeds on *Hiptage Madablota*, Gaetn., Nat. Ord. *Malpighiaceæ*, a woody climbing plant trailing over bushes and trees, and often of great length, found over most of tropical Asia. The larva draws up the sides of a leaf with a few stitches of silk, or fastens two leaves slightly together and lies concealed within them when not feeding. The pupa is attached to a leaf by the tip of the abdomen, with a girdle round the middle, and is hidden within two or three leaves drawn loosely together with a few strands of silk. The pupa is slightly powdered with a white substance.



GENERAL NOTES.

During July and August of this year (1906) through the kindness of Lieut.-Commander R. E. Vaughan, R.N., I had a very interesting run up the West River and the Nanning branch as far as Kwei-hsien in Kwangsi. These months, as already stated, are not good from an entomological point of view, but there seems to be scarcely any difference between the butterfly fauna there and at Hongkong, with the exception of the circumscribed forest area at How-lik, where several species new to the Hongkong list were met with, and where some butterflies which are rare in Hongkong and Macao were common, which latter is also the case at some other places up the West River. *Danaüs plexippus* and *D. chrysippus* were common at least as far as Kwei-hsien, where the foodplant (*Asclepias curassavica*) of the larvæ was found growing amongst the curiously pitted and weathered black limestone rocks on the plain opposite the city, on the other side of the river. This plain is a great change from the scenery of the coast and Delta, though the red soil is still evident in many places, and the hills are mostly barren. The country here is more sparsely populated than anywhere below Wuchau, or perhaps I should say less densely populated. The plain opposite Kwei-hsien is covered with long coarse grass sprinkled with small bushes in places, and traversed in circuitous Chinese fashion by rough cart tracks, cut by the huge tyreless wheels of the farm-carts, in universal use there. Groups of jagged limestone rocks rise from the plain, looking almost black in the distance, but most of them with a fair amount of vegetation growing on the ledges and summits, and even a few large trees; whilst the inevitable joss-house is perched on two or three of these isolated pinnacles. These rocks are probably over three hundred feet in height, and much resemble those at Shui-hing. The ledges and summits of these rocks have very likely proved a refuge for several rare plants, as many of them are inaccessible without ropes and other gear. *Danaüs melanoides* occurred at Tam-chau, but seemed very scarce.

After Wuchau no Lantana was seen, and there it was growing in a garden, evidently planted, with a few escapes not far away. *Lethe confusa*, rare at Hongkong, is one of the commonest Satyrids at How-lik, and also occurs frequently at Wuchau. *Euthalia phemius* was extremely abundant at How-lik during July, but had much fallen off in numbers in August. *Hestina assimilis* during July was very common in many places at Wuchau, and it also occurs at Tam-chau. *Athyma sulpitia* was common at Luk-tau and abundant on the banks of the path leading from Lok-yum to How-lik, where the shrubby herb *Vitex Negundo* was in full bloom, its pale bluish or lavender flowers attracting hosts of insects. One specimen of *Limenitis procris* was taken at Kwei-hsien. *Zemeros flegyas* is common at many places up the river, especially about Sam-shui and Wuchau. *Neopithecops zalmora* is very common in all the patches of wood

along the riverside right up to Kwei-hsien. *Catochrysops strabo* was very abundant at the latter place, especially on the grassy plain mentioned above, where it was the commonest butterfly during the early part of August. Two specimens of *Curetis acuta* were taken one day at Tam-chau in August, so it is probably not rare there. *Megisba malaya* occurred in numbers during August in the woods on the big hills behind Tam-chau. **Ilerda epicles* was taken at Tam-chau and How-lik. *Gerydus chinensis* occurs at least as far up the river as the latter place. *Deudorix epijarbas* was taken at Kwei-hsien. *Delias hieris* occurs at Wuchau. One specimen of *Dercas verhuelli* was taken at How-lik in the middle of August. *Papilio aristolochiæ* was one of the most interesting butterflies observed, for it seemed absolutely confined to the limestone pinnacle rocks on the plain at Kwei-hsien, in the crannies of which the foodplant of the larva was probably growing. This insect did not appear even on the plain except in the close vicinity of these rocks. In the early part of August it was there the commonest butterfly, and large numbers were observed, though from the worn condition of most specimens, it was then evidently on the wane. *P. aristolochiæ* has a somewhat different flight from most of the *Papilioninæ*, for it flies rather steadily and chiefly with the forewings, these being rapidly vibrated whilst the hindwings are (apparently) almost stationary, though expanded. Three or four individuals of *Papilio xuthus* were taken at Sam-shui and How-lik in the middle of July, much earlier than it occurs on the coast, but they were evidently just emerged. *Leptocircus curius* was fairly common at How-lik, where it haunted the stream, flying over the surface of the water like a dragonfly—sometimes slowly, when the white markings on the wings showed up distinctly—sometimes with great velocity so that the eye could not follow it. Often it rested on the rocks or on foliage, or sitting on the damp sand on the margin of the stream it sucked up the moisture. It seemed fond of the flowers of some rather large trees (*Eugenia* sp.) which overhung the stream, and delighted in alternate sun and shade, but remained hidden on cloudy, sunless days. The *Hesperiidæ* were well represented at How-lik, and several species new to the Hongkong list were taken, as well as nearly all those which occur at the latter place, and they are probably all to be found at How-lik at the proper seasons. *Caprona syrichthus* has already been mentioned as fairly common on the plain at Kwei-hsien. Two species at least of *Ornithoptera* occur at How-lik. Entomologists certainly owe a debt of gratitude to these Buddhist monasteries which have preserved even these small afforested areas scattered over China, which would otherwise undoubtedly long ago have become the prey of the Chinese wood-chopper. The monks keep special watchmen all round their estate at intervals, who are on the look-out both day and night from rough shanties elevated on posts to prevent the cutting of trees and brushwood, not to mention grass, which is extensively employed as fuel in brick and lime kilns along the banks of the West River. The Buddhist religion, of course, prohibits the destruction of animal life, and during a stay of several days at the monastery not a fowl or a pig was to be seen anywhere over the estate, nor even a dog—animals which are indispensable features of everyday Chinese life—the pigs especially being very destructive to plants and young trees.

* In the Chinese form of this *Lycænid* the ♂ often has an orange patch on the upperside of the forewing, similar to that of the ♀, but the latter has not the purple flush over the upperside of the wings.

There is but one monastery at How-lik, a large Buddhist establishment perched on a terrace in the midst of the wood in a gap of the hills, and at a height of perhaps a thousand feet, the hills and wood rising some hundreds of feet higher. The adjoining country is very hilly, especially at Shui-hing, but there are no summits much over three thousand feet in height. The path along the bank leading up from Lok-yum to the monastery is nicely shaded by shrubs and trees on either side for about a mile from the river bank, a few of the trees being really large specimens; there is also a fair amount of undergrowth and flowering plants along the bank for nearly half the distance: the rest of the way is rather bare until the How-lik wood itself is reached, some five or six miles inland from the river.

The Lo-fou hills, about sixty miles E. of Canton and some 20 miles N.N.E. from Sheklung form a rather extensive and somewhat isolated granitic mountain mass for the most part bare of trees, but covered with long coarse grass and herbage. Nearly a dozen Buddhist and Taoist monasteries lie scattered along the southern, eastern and north slopes—some just at the base between the spurs, others at varying heights up to about 800 ft., except the temple at Put-wan-tsze (now in a ruinous condition and uninhabited) at a height of 3,500 ft. Around all these temples, except Put-wan-tsze, are woods of more or less extent, usually filling the sides and bottom of large ravines down which one or more streams flow. Few of the trees are of any considerable size except some of the firs at two or three of the monasteries, but compared to the usual S. China country the Lo-fou district is well wooded with small and moderate-sized trees of many species, and the small and monotonous fir of most S. China hills is replaced by two or three much finer trees. There is also a fine growth of flowering shrubs and plants and other undergrowth.

The top of the Lo-fou mass is very extensive and on the average perhaps 3,500 ft. in height, with many hummocks rising higher in all directions, one attaining upwards of 4,000 ft. In company with Mr. F. Muir of the Hawaiian Sugar Planters Assoc. Experiment Station I visited these hills in the latter part of October, 1906, but we found that from an entomological point of view we were rather late in the season. Though October is undoubtedly the best autumn month for insects as a whole on the coast, at Lo-fou the very numerous flowering shrubs, trees and plants were most of them already in fruit; probably April and May in the spring and August and September in the autumn would be the best months for insects at Lo-fou-shan. However, Mr. Muir, who worked all Orders except Lepidoptera, found many species which he had not taken at Hongkong and the coast region—amongst them an interesting green mantis with pointed eyes and large markings on the tegmina, and pink wings, belonging to the *Harpagidæ*, which was common on the flowering plants, resting conspicuously on the upperside of the blooms. It is a smaller species than the common green mantis of Hongkong, and unlike the latter usually sought to escape capture by flight. The Hongkong species (*Hierodula saussureii*) we did not see at all. Mr. Muir also specially noted amphibious *Neuroptera* and *Syrphid* flies as being numerous, and we obtained many interesting *Diptera* and *Hymenoptera*. Beetles were scarce.

As regards *Lepidoptera* I found three or four species of *Lycænida* new to the Hongkong list, two species of *Arhopala* being very common, one of them *A. rama*; and on the summit near Ku-u-toi (3,700 ft.) a large and handsomely-marked *Satyrid* which appeared to be

confined to the higher parts of the mountain. The large and fairly level areas at about 3,500 ft. are chiefly covered with long coarse grass and reeds, difficult to force a way through and probably marshy in the wet season; but there are a few rough foot-tracks, as even here a few squatters have cultivated small patches of rich-looking marshy black soil, and raise vegetables, etc.; they live in small \wedge -shaped reed hovels. The usual *Precis* species were fairly common here, also *Argynnis hyperbius*, but most insects were rather scarce—even grasshoppers and dragonflies, the commonest grasshopper being a different species from the one most abundant on the lower ground—and I saw none of the small *Zizera* so extremely numerous below, and only one or two other Lycænids, one being *Catochrysops cnejus* and another an *Arhopala* sp. *Neptis eurynome*, however, was fairly numerous; and *Parnara guttatus*, almost the only Hesperid represented on the summit except a few *Padraona dara*, was very abundant at the flowers growing amidst the long grass.

We were both much disappointed in the "virgin forest" at Ku-u-toi mentioned by Mr. Bourne in his "Lo-fou Mountains"; the ravine, though certainly a beautiful rocky and precipitous glen, was neither inaccessible nor was it filled with large trees, but with fairly thick jungle and small trees and bushes. In one of the shrubby ravines near the summit, with a rocky and picturesque stream flowing down it, we saw a party of the pretty little so-called Hill-tits (*Leiothrix luteus*) often kept as cage-birds by the Chinese, and nearly always to be seen in the Hongkong bird-shops. They do not appear to descend to the lower slopes. The Hwamei (*Trochalopteron canorum*) sang delightfully in the morning and evening from the gullies filled with bushes and scrub, and partridges called to one another, but on the whole there did not seem to be much bird-life on the summit—not even Kites, a whole army of which continually sailed over the two wooded hills between which is situated the monastery of Siu-liu-kun, in a valley about 800 ft. above sea-level, and whence we climbed to the summit by a steep but practicable foot-path, sometimes earth and rock, sometimes rough stone steps, but evidently falling into disuse like the temple of Put-wan-tsze to which it leads. On the summit a few *Euphœinæ* were seen, and two *Dercas verhuelli* were taken in one of the woody glens. At Put-wan-tsze about 7 a.m. on Oct. 29th the temperature was 58° F.

In the woods on the lower levels *Limenitis sybilla* is a common insect, whilst *L. procris* seems rare. *Symbrenthia lucina* was fairly common in the valleys. *Curetis dentata* is evidently common at Lo-fou, as also is *Ilerda epicles*. *Gerydus chinensis* was very abundant in the woods at the base of the hills. *Lethe confusa* was perhaps the commonest butterfly during our stay at Lo-fou, whilst *L. europa* was rare. *Melanitis leda* was abundant amongst the dead leaves in the woods, and the specimens were very large, dark, and with greatly-developed forewing tips and hindwing "tails." One noticeable absentee was *Clerome eumæus*, so common at Hongkong and Macao, of which not a single specimen was observed. Though there was no lack of shady streams and rank undergrowth there seemed to be few species of Hesperidæ abroad at the time of our visit, with the few exceptions already noted.

Apparently the Schach Shrike (*Lanius schach*) and the common Bulbul (*Pycnonotus sinensis*), our commonest coast birds, do not favour the Lo-fou hills, for we saw but few of them except in the plain; but the same species of Barbet resident at How-lik also occurs in all the

Lo-fou woods, whilst the How-lik squirrel is very numerous but seems confined entirely to the Lo-fou district, this being also the case with the Barbet. The common bamboo at Lo-fou is a pretty and graceful spindle species with long and narrow leaves; the much-branched, thorny or scrub bamboo so common on the coast seems to be absent or rare in the Lo-fou district. Lantana, evidently planted, has reached Lo-fou, but we saw no prickly-pear and but little Pandanus, the few small patches which occurred being a woodland species and different from the common coast plant. On the summit of the mountain large thistles with purple flowers—very like the common English thistle—grew in profusion, and as usual were very attractive to insects. In one or two valleys by the side of streams a few tree-ferns were growing.

From Shek-lung to the base of the Lo-fou hills is a practically level plain of brown alluvial soil, cultivated chiefly with rice, and irrigated by the beautifully clear streams from the hills. To the north, east and west several fairly high hills are seen in the distance, not in distinct ranges but placed confusedly like the coast hills. From its entrance a few miles below Whampoa the East River has a tortuous course to Shek-lung between low banks, sometimes widening where an island occurs, but on the average not 300 yds. wide; sandbanks are numerous and navigation difficult, but there seem to be no outcrops of rock.

The Chinese monasteries are now no longer seats of learning, and the reverence with which these establishments were formerly regarded seems to be dying out, and with the decay of the temples the trees, alas, are becoming the prey not only of the neighbouring villages but also provide fuel for the monks themselves. The various temples are most of them extensive buildings, but some portion or other of the fabric is generally in a delapidated condition; the monks did not seem to be numerous and religious duties were apparently carried on in a somewhat perfunctory manner, in contrast to the monastery at How-lik—in fact the Lo-fou monasteries seem to be in a moribund condition. However, in a few places we noticed new erections in the shape of the usual small rest-houses with highly-ornamented, very perishable roofs supported by massive granite pillars and balustrades calculated to resist the wear of ages, but put together with mud mortar in true Chinese style.

Large hill-fires were constantly burning on different spurs and foot-hills whilst we were at Lo-fou. These fires not only burnt off the grass and bushes but destroyed large numbers of fine trees on the outskirts of the woods. The district immediately surrounding the Lo-fou hills is not so densely populated as the Delta or many parts of the coast, and the villages—for the most part small and fairly well built of rough granite—backed by nice patches of wood and a few fair-sized trees, with usually a clear and rocky stream in the foreground—are very picturesque. The hillsides are not disfigured by the unsightly brick and plaster graves common to many parts of S. China. Although the Lo-fou mass rises abruptly from a plain but a few feet above sea-level, its great bulk and extent and the fact that there is no commanding peak detract somewhat from its apparent height; the true height can be better realised by comparing it, when approaching from Shek-lung, with the conspicuously peaked hill slightly nearer than and a little to the west of the main portion of Lo-fou; this hill is certainly not under 2,000 ft. in height. The Lo-fou hills can be distinctly seen on a sufficiently clear day as soon as the entrance to the East River is reached, about N.E. by E. and perhaps fifty miles distant.

Species of *Mastax* (a peculiar genus of Locusts) occur not uncommonly at Lo-fou and How-lik, also on Hongkong island; chiefly black, but brilliantly coloured with patches of metallic green. These seem to be confined to well-wooded and hilly districts, but a soberly-tinted brown species occurs at Macao.

Very primitive mills for husking rice were in use at all the monasteries, though they are not often seen in the villages near the coast ports. Worked like the common native hand-mill, but made chiefly of basket-work, the rubbing-faces were formed of an upper and lower circular pan of wicker-work filled with mud or loam, in both of which were embedded strips of hard-wood, after the pattern of the grooves in the stones of a flour-mill, projecting very slightly above the clay surface. The latter was merely sundried to harden it and secure the wooden teeth.



APPENDIX.

Hestina assimilis, Linn.

Egg, sub-globular, flattened at the base, very finely striated or ridged axially; general colour pale green, the ridges yellowish-white. Laid singly on the upperside of leaves of *Celtis sinensis*, Pers., Nat. Ord. *Urticaceæ*, a tree found all over China except the extreme north; also in Japan.

Larva, just hatched, pale yellowish-green, head dark brown, the horns not showing; posterior bifid. A fine, darkish dorsal line. Dorsal surface slightly sprinkled with a few short whitish hairs. When the young larva is about $\frac{1}{4}$ inch in length the horns on the head show plainly. Fullgrown, limaciform (much the shape of larvæ of *Charaxes*) of a general rather dark green irrorated with light yellow, each speck of yellow centred with a very short blackish bristle, giving the larva a slightly rough appearance. A dorsal pair of light yellow small processes on the third segment; a still smaller pair on the sixth segment; a rather large pair on the eighth seg., broad transversely at the base and slightly pinkish there; a small pair on the eleventh seg. All these processes are slightly tuberculous and spiny with very small bristles; posterior bifid, the tips yellowish. A very indistinct and interrupted light yellow lateral line just above the prolegs each side, and above this an indistinct diagonal line on each segment each side. Short, sparse whitish hairs in a lateral row each side above the legs, the hairs springing from the diagonal yellow markings. Head darkish green with light yellow vertical markings down the face; *horns dark green, shortly branched at the tips and with a few small snags up the stems, the snags light yellow, brown at the tips and stubbly with short black hairs at the tips only. The branched tips of the horns are brown. Horn-stems rough and slightly sprinkled with a few very short bristles. A row of four or five small yellow processes down each side of the face, with a few still smaller prickles continuing round the top of the head. Legs pale yellow; prolegs and underside glaucous green. The tips of the bifid posterior are usually kept close together, appearing much like a single projection.


Pupa, general colour rather dark green, with a whitish or hoary appearance over much of the surface. Abdomen very broad and compressed laterally, forming a sharp dorsal ridge, each

* The horns are not solid, but tubular from tip to base; the exterior wall of hard chitinous substance, the interior channel filled with soft tissue communicating at the base with the interior of the head. In the fresh larva the horns may be snapped near the base and drawn away, exposing the core of tissue.

segment terminated by a sharp, light yellow projection, and the extreme edge of the abdominal ridge is also light yellow. An obscure triangular yellow spot each side of the ridge on the fourth abdominal segment, and four or five indistinct diagonal streaks, of a rather darker green than the body-colour, across the segments, each side of the abdomen. Head bifid, the tips yellowish green. Attached by the tip of the abdomen without a girdle. The chitinous envelope of this pupa is of a rather soft consistence.

Larva, Pl. VIIa, Fig. 9, pupa Fig. 8.

Euthalia lubentina, Cram.

Egg, domed but much flattened, thus in section , the upperside honeycombed with large but shallow reticulations, from the ridges of which spring stout yellow hairs, each hair bearing at the tip a small globule of yellow viscous fluid. General colour of the egg shiny yellow-brown. Laid singly on the upperside of the leaves of *Loranthus chinensis*. See figure of egg on Plate VIIa.

Danais plexippus, Linn.

Under *Danais plexippus*, page 9, it should have been noted that this butterfly, especially during the middle of the dry season, often develops numerous white scales on the upperside of the hindwings, chiefly in the median interspaces just below the disc. cell, and also along the inner or abdominal margin; so that the hindwings often have a considerable extent of white. All the species of *Danais* here have a habit of settling towards evening on the underside of dead or bare twigs of trees, from which they hang with the wings closed. *Papilio clytia* also has the same habit.

Catochrysops cnejus, Fabr.

The larva of this Lycænid has, one on each side of the dorsal surface of the twelfth or penultimate segment, two retractile fleshy processes which are usually drawn level with the dorsal surface, but on occasion are exerted perhaps $\frac{1}{32}$ inch. The processes are pinkish white and the tops of them are slightly globular and provided with radiating glandular hairs. These processes can be exerted independently. There is also a dorsal glandular aperture on the median line of the larva, on the eleventh segment. The annexed sketch (much enlarged and diagrammatic) represents the retractile process on one side only of the larva; the glandular aperture (G) is indicated on the dorsal surface. A large species of gray and black ant occasionally obtains some kind of nutriment from the larva, which it touches with its antennæ and forelegs, whereupon the larva extrudes and vibrates the fleshy processes, which seem to be moist with some viscous liquid. The larva of *Catochrysops cnejus* is not, however, absolutely dependent on ants for its existence, as seems to be the case with the larva of *Spindasis lohita*, for I have reared many butterflies from the eggs without the intervention of ants. Besides *Abrus precatorius* the larvæ of *C. cnejus* also feed on *Pueraria phaseoloides*, Benth., Nat. Ord. Leguminosæ.



Polyommatus boeticus, Linn.

This Lycænid lays its eggs singly on flower-buds and young shoots of *Vigna sinensis*, Hassk., Nat. Ord. *Leguminosæ*, a large twiner with white flowers, climbing over bushes, etc. The egg is very small compared to the size of the butterfly; circular and flattened, pale greenish when first laid, afterwards whitish, reticulated on the top and round the edge.

Larva, fullgrown, the usual Lycænid type, general colour dull yellowish-green; a fairly distinct purplish longitudinal dorsal band. Three lateral rows, each side, of obscure purplish diagonal markings, three on each segment. Underside, legs and prolegs pale greenish-yellow. An obscure pale yellowish lateral band just above the legs each side. Just after a moult the larva is almost wholly light green, the dorsal band darker green, and the diagonal markings very obscure but of a slightly darker green. Upperside finely irrorated with dusky dots, due to very short and rather sparse stubbly hairs. Head brownish. This larva has no vestige of the retractile glands present in the larvæ of *Catochrysops cnejus*, *Spindasis lohita* and *Tajuria cippus*: it has, however, the transverse dorsal gland on the eleventh segment. The larva when young feeds chiefly on the flowers and buds, but later bores into and eats away the interior of the seed-pods, in which it lives.

Pupa, the usual dumpy Lycænid form, of a pale ochreous or flesh colour, with a rather distinct longitudinal dorsal dusky band. Four rows of small dusky spots down the dorsal surface of the abdomen (two rows each side of the dorsal band) altogether four spots on each segment. Whole surface of pupa more or less dotted with dusky, especially on the dorsal surface. Attached by a band round the middle, but apparently with little or no cremastral attachment. The larva seems to pupate either within a hollowed-out seed-pod, or beneath leaves, etc., which it sometimes slightly secures together with silk.

Genus Zizera.

From the specimens I have sent from this district Mr. H. H. Druce apparently makes three species viz: *Z. maha*, *Z. argia* and *Z. otis*. This information unfortunately came too late for publication with the Lycænidæ. The caption "*Z. maha*, Kollar," on page 71 should read "*Z. otis*, Fabr."; line 11, from the bottom of page 71 "Fig. 3, Pl. Va is a remarkable variety" *et seq.* should be deleted. But *Z. maha* and *Z. argia* are so close to one another, with every intermediate form leading imperceptibly from one to the other, that I cannot distinguish between them, and therefore carefully examined the genitalia, which also seem identical. The genitalia of *Z. otis*, however, are quite distinct from *Z. argia*.

Cupha erymanthis.

Commander Walker, in his "List of Hongkong Butterflies," states that both larva and pupa of this insect were so much infested with Ichneumons and Dipterous parasites that he never succeeded in rearing the butterfly. It is very likely that attacks of parasites account in great measure for the periodic scarcity of *Cupha erymanthis* and other butterflies mentioned at p. 56. Probably the eggs also are much parasitised; indeed, from the observations of several years I conclude that butterfly mortality is greater in the egg than in any succeeding stage, though there is much destruction amongst larvæ and pupæ. During December of this year (1906) the young fir-trees over a wide area at a place near Chin-san, Macao, were ravaged by caterpillars of a moth, *Metanestria (Eutricha) punctata*, many of which were still feeding on the trees, but thousands had already spun their cocoons in the fir-needles which they drew up together with silk into a bundle. Mr. F. Muir and I gathered 1,240 cocoons from widely-separated points of this area, and 932 or 75.16 % of the total number had been destroyed either by parasites (both Dipterous and Hymenopterous) or by a fungus disease. The eggs of the moth too, laid on the fir-needles in batches, were heavily parasitised by Chalcids of at least two species.

A *Katydid* was observed eating one of these large, hairy caterpillars; possibly a dead or diseased larva, but it may have attacked and killed a healthy specimen. Those larvæ which had perished from fungus were in many cases furnishing food to the nearly naked, flesh-coloured larva of a small moth.

Precis almana.

Besides *Ruellia repens*, the larva of this butterfly also feeds on *Hygrophila salicifolia*, Nees, Nat. Ord. *Acanthaceæ*, a very common plant here in streams and marshy localities.

Rapala varuna.

Egg hemispherical but flattened at top; of a pale green, apparently smooth but sparsely covered with minute whitish glandular stubble, giving the egg the appearance of being finely irrorated with white. Under the microscope the upper surface is seen to be very shallowly reticulated, with a glandular hair at each angle of the network. Laid singly on the fruit or shoots of *Glochidion macrophyllum*. The egg is small compared with the size of the butterfly.

Arhopala rama, Koll.

Fig. 16, Pl. VIII is *Arhopala rama*, Kollar.

Scent-sacs and Androconia.

The scent-sacs of *Danaïa limniacæ* and *D. septentrionis* (where these appendages develop into a deep, narrow pocket or sac on the underside of the hindwing, the opening into the sac being on the upperside in the middle of one of the interspaces) contain a few small bundles or packets of grayish-white fibres, which are loose or unattached to the sac; these fibres break to pieces at a touch and soon become dust. The androconia, or long silky hairs in the anal fold of the hindwings of some *Papilio* males have also at their base some of (apparently) the same fibres, but I fail to find any in the discal patch of hairs on the upperside of the hindwing of *Baoris oceaia* ♂. The ♂ of *Discophora tullia* has a discal patch of peculiar hairs or scales on the upperside of the hindwing, apparently analogous to that of the "brands" in the forewings of many males of *Euphlæa*. The scent-sacs, as already noted, are supposed to act as allurements to the ♀; Sharp says the functions of the androconia are still obscure; they are believed to exhale scent. The scent-sac of *Danaïa septentrionis* is formed by an outgrowth of both upper and lower membranes of the hindwing, but there seems to be no space between the two walls. The interior of the sac is lined with specialised scales. The annexed sketch represents a transverse section through the sac, and is diagrammatic and much enlarged, the two membranes being shown as if they were slightly separated. UM upper membrane. LM lower membrane. OS ordinary wing scales. SS specialised scales, NN nervules.



Scent-sac of *D. septentrionis*.

The scent-sac of *D. limniacæ* is very similar.

The scent-sac of *Danaïa chrysippus* is formed by an outgrowth of the upper wing-membrane of the hindwing, and a slight depression of the lower membrane, which form two walls with a space between, filled with an oily liquid. The exterior of the sac is covered with the ordinary wing-scales, but the interior is lined with minute, peculiar and pale ochreous scales, with a patch bare of scales just under the lip of the sac-cover. The annexed diagram represents a transverse section (very much enlarged and diagrammatic) through the scent-sac:—UM upper membrane, LM lower membrane. S interior of sac. O space between the membranes filled with liquid. BP space bare of scales. N nervule.



Scent-sac of *D. chrysippus*.

The scent-sac of *D. plexippus* is very similar.

Larva of *Spindasis lohita*.

CT chitinous tube. RP retractile process, soft or fleshy and of a yellowish-white, granulated finely except on the tip; shown fully exerted. B yellowish bristles or stiff hairs. L last segment. S spiracle. There are two of these retractile organs, one each side, but only one is shown, much enlarged and diagrammatic. There is also a transverse slit-like dorsal gland, situated on the middle of the back, apparently just between the eleventh and twelfth segments. See pages 78 and 79.

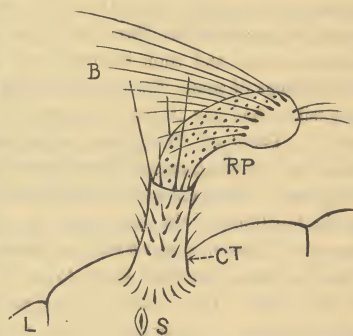
Whilst staying in Macao Mr. F. Muir dissected several larvæ of the *Lycænids* mentioned below, and gave me the following notes :—

"In *Spindasis lohita* each retractile process on the twelfth segment is formed by a growth of the hypodermis which, by pressure of the fluids within the body, can be protruded through a hole in the cuticle, and again withdrawn into the body by a pair of muscles running from the tip of the process to the floor of the abdominal cavity. No glands open on the processes, but no doubt the hypodermis contains glandular cells. There is a pair of large glands each opening by a duct at the corners of the dorsal transverse slit on the eleventh segment.

"In the larva of *Catochrysops cnejus* a similar mechanism works the processes, and a pair of glands open into a transverse dorsal slit; but in the specimens I examined the glands were not so large as those of *S. lohita*.

"In the larva of *Polyommatus baeticus* no movable processes are developed; there is, however, a dorsal transverse slit into which a pair of glands open, as in *C. cnejus*." The mechanism of these processes appears, therefore, to be almost identical with that of the filaments protruded from the anal fork of the larva of the Puss moth (*Cerura vinula*) described by Professor Poulton in "The Colours of Animals." In the case of this larva "protrusion is brought about by the pressure of the blood, which drives the filament before it. The process could be almost exactly imitated by fastening a string to the tip of the finger of a glove and letting the string pass down inside the finger and out at the wrist. The finger could then be withdrawn by pulling the string, and protruded by blowing into the glove."

The ants which attend the larvæ of *Spindasis lohita* are a species of *Oremastogaster*.



Retractile dorsal process of *Spindasis lohita* larva.

Papilio paris.

The larva of this *Papilio* has already been noted as feeding on *Xanthoxylum nitidum*, but its chief foodplant is *X. Avicennæ*, D.C.; an erect but weak or flexuose shrub, usually very prickly on both stems and branches, but in this respect there is much variation individually, probably due to the fact that some few specimens partially escape periodic chopping by the firewood gatherers.

The osmeterium or nuchal horn of the larva of *P. paris* is orange yellow.

Parnara guttatus.

Pupa, smooth, head rounded, not beaked; general colour very pale yellowish. Fixed by the abdomen-tip only, in a twisted-up leaf, the interior lined with a rather strong silk film, forming practically a cocoon. Slightly dusted with white flocculent matter.

Padraona dara.

Pupa, smooth, abdomen yellowish or ochreous, thorax greenish, with two small brownish dorso-lateral protuberances or warts, one each side near the eye; probably they are spiracle coverings. On the top of the head is a small black chitinous process, resembling the "cocoon cutters" found in many Lepidopterous pupæ. Attached by the abdomen-tip only inside a leaf-tube, and slightly powdered with white substance. This Hesperid, like the majority of butterflies here, has broods in both wet and dry seasons; the wet broods completing their metamorphosis in 4-5 weeks: the egg and pupal stages being very brief. The following data for *Padraona dara* are closely approximated by many other butterflies as to the duration of the various stages in the dry season:—Eggs laid: 3-10-06, hatched 19-10-06. Larvæ pupated 8-1-07. Imagines emerged 12-2-07 and following day. Thus from egg to imago took roughly 18 weeks, the larval stage occupying 81 days, the pupal stage 35 days.

Glandular hairs.

On p. 98, the larva of *Terias hecabe* is described as having hairs on the tips of which are minute globules of liquid. These hairs are, most probably, glandular hairs, i.e., hollow, the liquid which appears at the tips being secreted by glands at the base.



Pupa of *Charaxes athamas*.

Larva and Pupa of *Cupha erymanthis*.

COLLECTING NOTES.

For collecting butterflies nothing more is necessary than a net, an empty cigar-box and 3-cornered paper envelopes of various sizes to suit the insects. The envelopes should be of fairly stout but not stiff paper; the butterflies to be placed in these envelopes with closed wings, and packed away closely in the cigar-box, so that they will not shake about in travelling. 400 or 500 butterflies of average dimensions can be packed easily into one of the deep, square-shaped boxes. Flake naphthaline should be sprinkled between the layers of envelopes, but before finally closing the box you had better put in a few drops of benzine. This will kill any insect life which may have chance to creep in, even that worst of pests here in a collection—a tiny beetle of the genus *Dermestes*. If possible choose a fine, dry day for packing up finally, and give the papers an airing before filling them into the box.

Set no butterflies except those which you really require for working at, comparison, etc. Set insects in this climate need an enormous amount of care and attention, and even then deteriorate rapidly. Damp, mould and mites play havoc with them in the wet season; in the dry months the antennæ and legs snap off at the slightest touch or jar, and the forelegs especially are often most valuable for determining species and sex, as also are the palpi.

No cyanide bottle is required for butterflies, though one may be employed for *Lycanidæ* and *Hesperiidæ* if thought well.

Date and locality are most important, and without these data insects are of little value. In the case of papered butterflies the date and locality should be written on the envelopes; with set butterflies these data should be written on a small slip of paper or thin card and put on the pin, below the insect.

As soon as possible after a box is filled it should be sent home. The butterflies can then be relaxed and set, years after they were captured if necessary, in as good condition as when first taken.

Eggs should be taken with the leaf or shoot on which they are laid, and placed (without water, and if wet they should be dried in the air) in a wide-mouthed bottle corked up until they hatch. When the larvæ emerge, put the old leaves on to a fresh spray of the foodplant, to which the larvæ will soon remove, and keep them whilst very young in a bottle. Afterwards you can change them to a breeding-cage and put the plant in a small bottle of water; put a little cotton or other filling in the neck of the bottle round the stem of the foodplant, or some restless larvæ will drown themselves; mosquitos will also breed in the water if they have access. Larvæ should

always be supplied with absolutely fresh food, and they must not be picked off the old leaves with the fingers, but coaxed on to the fresh plant slowly—or the part of the leaf they are on should be snipped off and placed on the fresh leaves. Larvæ can be carried in small boxes with a leaf or two of the foodplant, but they should not be crowded together; smooth, hairy and spiny larvæ cannot be mixed together without damage resulting. Larvæ of Hesperids in leaf-tubes should be taken with a stem to the leaf, to be placed in water as soon as may be: if the tube is detached you had better open it and put it on a fresh spray, as bamboo, reed and other leaves quickly shrivel, and if the larva is about to moult or pupate it will not crawl out, but will probably be injured by the contraction of the leaf.

Some leaves keep fresh much longer in corked jars than they do in the open air with the stem in water. Foodplants brought from a distance should be gathered in the evening and carried home in tightly-fitting tin boxes.

Butterflies may be relaxed by pinning them on cork or soft wood, and putting them in a box with a layer of damp sand in the bottom. A few drops of carbolic acid will tend to prevent mould, or a little flake naphthaline mixed with the sand; the latter also tends to relax the insects quicker.



PLATE Ia.

1. Larva of *Euploea amymone*.
2. Pupa „ „ „
3. Larva „ „ *midamus*.
4. „ „ „ *mulciber*.
5. „ „ *Danaïs chrysippus*.
6. Pupa „ „ „
7. Larva „ „ *similis*.
- *8. Pupa „ „ „
9. Larva of *Melanitis leda*.
10. Pupa „ „ „
11. Larva of *Lethe europa*.
- †12. Pupa „ „ „
13. Larva of *Mycalesis mineus*.
14. Pupa „ „ „
15. Larva of *Ypthima avanta*.
16. Pupa „ „ „
17. Larva and pupa of *Clerome eumœus*.

° The blue on this pupa indicates silver.

† The yellow on this pupa indicates gilt.

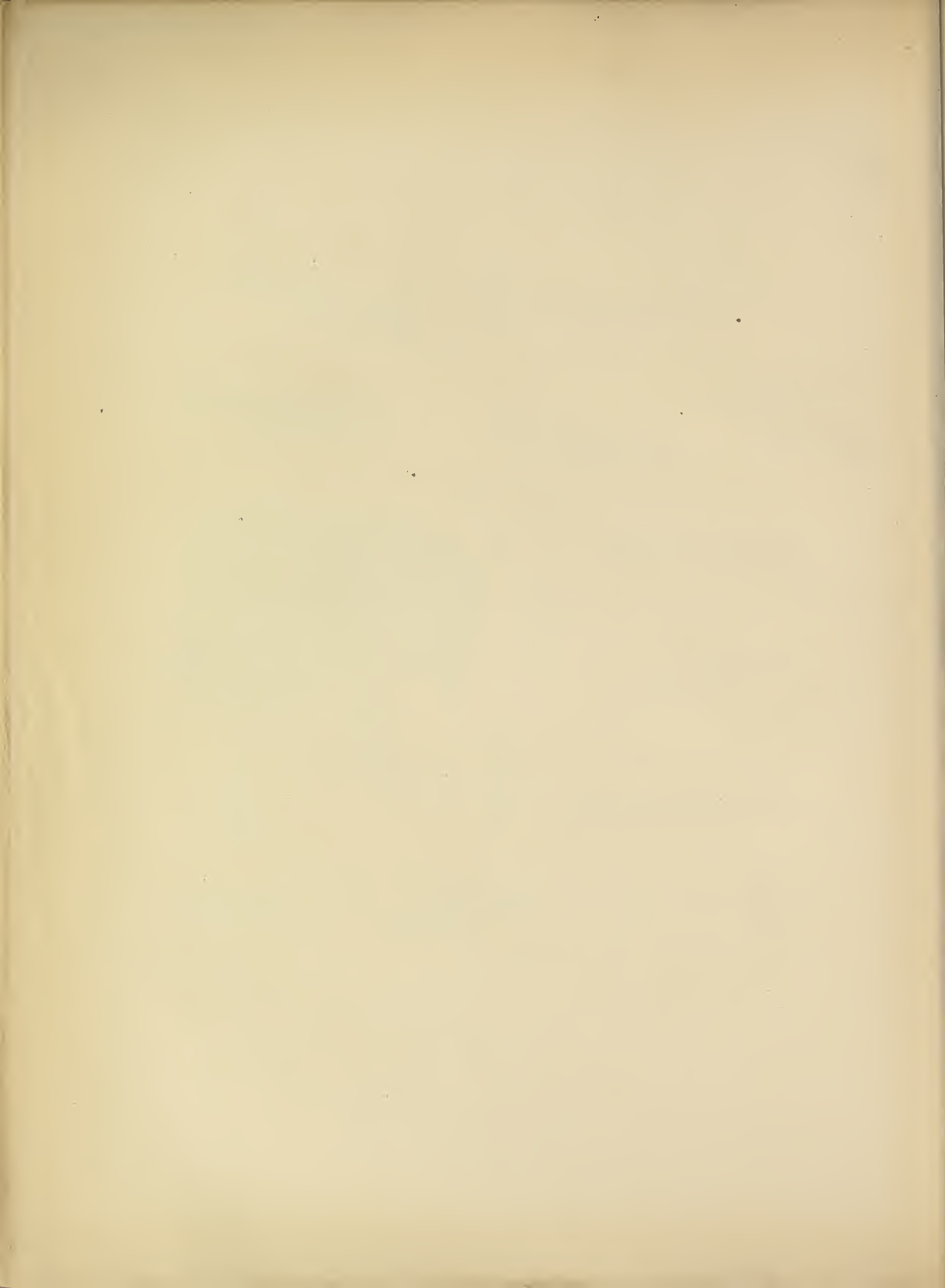




Plate III

PLATE IIa.

1. Larva of *Discophora tullia*.
2. Pupa „ „ „
3. Larva of *Euthalia lubentina*.
4. Pupa „ „ „
5. Larva of *Limenitis procris*.
6. Pupa „ „ „
7. Larva of *Athyma perius*.
- *8. Pupa „ „ „
9. Larva „ „ *nefte*.
- †10. Pupa „ „ „
11. Larva of *Neptis eurynome*.
- †12. Pupa „ „ „
13. Larva „ „ *columella*.
- *14. Pupa „ „ „
15. Larva of *Charaxes athamas*.
16. „ „ „ *polyxena*.
17. Pupa „ „ „

* The blue on these pupæ indicates silver.

† The yellow on these pupæ indicates gilt.





PLATE IIIa.

1. Larva of *Atella phalantha*.
- ^a2. Pupa " " "
3. Larva of *Ergolis ariadne*.
4. Pupa " " "
5. Larva of *Apatura parisatis*.
6. Pupa " " "
- †7. Larva of *Precis almana*.
8. Pupa " " "
9. Larva of *Abisara echerius*.
10. Pupa " " "
11. Larva of *Delias aglaia*.
12. Pupa " " "
13. Larva " " *hierte*.
14. Pupa " " "
15. Larva of *Hebomoia glaucippe*.
16. Pupa " " "
17. Larva of *Ixias pyrene*.
18. Pupa " " "
19. Larva of *Terias hecabe*.
20. Pupa " " "
21. Larva of *Catopsilia pyranthe*.
22. Pupa " " "
23. Larva of *Pieris nerissa*.
24. Pupa " " "
25. Larva " " *canidia*.

° Parts left white in this pupa indicate silver, or silver-gilt.

† From larva soon after a moult, showing base of spines yellowish.





Plate IVa

PLATE IVa.

1. Larva of *Papilio memnon*.
2. Pupa " " "
3. Larva " " *clytia*.
4. Pupa " " "
- 5.*Larva " " *antiphates*, young stage shown beneath.
6. Pupa " " "
7. Larva " " *helenus*, young stage shown beneath.
8. Pupa " " "
9. Larva " " *demoleus*, young stage shown beneath.
10. " " " *agamemnon*, young stage shown beneath.
11. Larva of *Catochrysops cnejus*.
12. Pupa " " "
13. Larva of *Tajuria cippus*.
14. Pupa " " "
15. Larva of *Gerydus chinensis*.
16. Pupa " " "
17. Larva of *Ismene ataphus*.
18. Pupa " " "
19. Larva of *Notocrypta feisthamelii*.
20. Pupa " " "
21. Larva of *Matapa aria*.

* Showing nuchal horn (osmeterium) thrust out.







PLATE Va.

1. Variety of *Catopsilia pomona* ♀.
2. *Parnara sinensis*, Mabille.
3. Variety of *Zizera argia* ♀.
4. Diagram sketch of posterior of larva of *Spindasis lohita*, showing the two tubulures, from one of which the filament or gland is exserted. (About three times nat. size.)
5. Lower part of abdomen of *Euploea anymone*, showing the anal scent-gland, the left-hand branch in process of retraction, the other fully extended. (About twice nat. size.)





Pl. VIa.



PLATE VIa.

1. Larva of *Argynnis hyperbius*.
 2. Pupa „ „ „
 3. Larva of *Hypolimnias bolina*.
 4. Pupa „ „ „
 5. Larva of *Vanessa canace*.
 6. Pupa „ „ „
 7. Larva of *Dercas verhuelli*.
 8. Pupa „ „ „
 9. Larva of *Spindasis lohita*, showing an ant feeding at the tubulures.
 10. Pupa of *S. lohita* affixed within one of the small leaf-nests of the ants ; part of the covering is torn open, in order to show the pupa. See page 79.
 11. Pupa of *Erionota thrax*, showing the proboscis enclosed in a case separate from the body of the pupa.
 12. Lycænids (*S. lohita*), showing the anal lobes as they appear in life, when the butterfly is resting. See page 78.
 13. *Everes argiades* ♀.
 14. *Arhopala birmana* ♂.
 15. *Nacaduba atrata* ♂.
 16. Egg of *Euplœa midamus*.
 17. „ „ *Dercas verhuelli*.
 18. „ „ *Vanessa canace*.
 19. „ „ *Gerydus chinensis*, showing hole from which larva has emerged.
 20. „ „ *Athyma perius*.
 21. „ „ *Terias hecabe*.
- All the figures are nat. size, except Figs. 16-21, which are greatly enlarged.



Pl. VIIa.



PLATE VIIa.

1. *Parnara mathias*, Fabr. ♂.
 2. " *bromus*, Leech, ♂.
 3. " *colaca*, Moore (?)
 4. " " " (?)
 5. *Telicota augias* ♀, upperside only.
 6. *Ampittia maro* ♀, " "
 7. Egg of *Euthalia lubentina*, showing hairs and globules of liquid.
 - 1a. *Lateral view (looking on outside) of genitalia of *Parnara mathias* ♂, showing
suranal plate and claspers. Plan of suranal plate (looking on upperside) shown beneath.
 - 2a. Lateral view (looking on outside) of genitalia of *Parnara bromus* ♂, showing
suranal plate and claspers. Plan of suranal plate (looking on upperside) shown beneath.
 - 3a. Lateral view (looking on outside) of genitalia of *Parnara colaca* (?) ♂, showing
suranal plate and claspers. Plan of suranal plate (looking on upperside) shown beneath.
 - 4a. Lateral view (looking on outside) of genitalia of *Parnara colaca* (?) ♂, showing
suranal plate and claspers. Plan of suranal plate (looking on upperside) shown beneath.
 8. Pupa of *Hestina assimilis*.
 9. Larva " " "
 10. Leaf-tube of larva of *Matapa aria*.
 11. Leaf-shelter of larva of *Suastus gremius*.
- Figs. 1, 2, 3, 4, 5, 6, 8 and 9 are nat. size.
Figs. 1a, 2a, 3a, 4a and 7 are much enlarged.
Figs. 10 and 11 are reduced.

° The hairs and bristles are not shown in any of the figures of genitalia.

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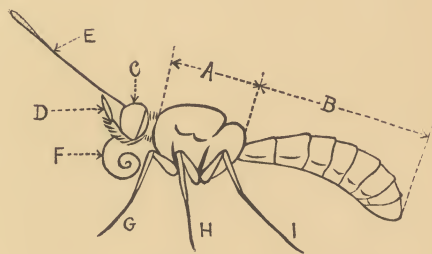
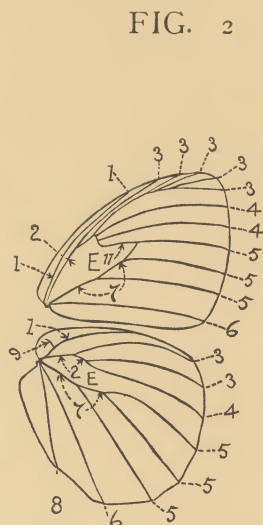
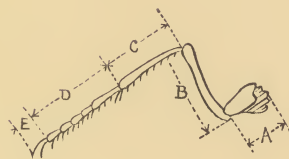
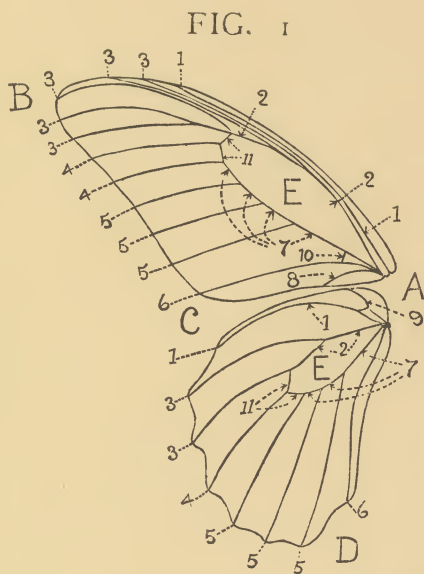


FIG. 3

FIG. 4

FIG. 1.

Wings of *Papilio paris*.

A—Base of wings. B—Apex of forewing. D—Anal angle of hindwing. AB—Costal or anterior margin of forewing. AC—Inner margin of forewing and costal margin of hindwing. BC—Outer margin of forewing. CD—Outer margin of hindwing. DA—Inner or abdominal margin of hindwing. E—Discoidal cell.

Forewing.

1—Costal nervure. 2—Sub-costal nervure. 3—Sub-costal nervules. 4—Discoidal nervules. 5—Median nervules. 6—Sub-median nervure. 7—Median nervure. 8—Internal nervure, not present in many butterflies in the forewing. 10—Interno-median nervule, also wanting in many butterflies. 11—Disco-cellular nervules, in some butterflies very slender, or almost obsolete.

Hindwing.

As in forewing, but 9 is the præ-costal nervure. Generally present, but in some butterflies very slender, or almost wanting.

FIG. 2.

Wings of *Clerome eumeus*.

As in Fig. 1, but 8 is the internal nervure of the hindwing, present in the majority of butterflies, but wanting in *Papilio*. In many butterflies the discoidal cell of the hindwing, as shown in Fig. 2, is open: in some the cell of the forewing is also open, but in the majority both cells are closed, though often but slenderly, by disco-cellular nervules.

FIG. 3.

Mid-leg of a *Papilio*.

A—Coxa. B—Femur. C—Tibia. D—Tarsus. E—Ungues or claws.

FIG. 4.

A—Thorax. B—Abdomen. C—Head. D—Palpus. E—Antenna. F—Proboscis. G—Fore-leg. H—Mid-leg. I—Hind-leg.

Figs. 1 and 2 are natural size; Figs. 3 and 4 are much enlarged and diagrammatic.

The sign ♂= male.

„ ♀= female.

Larva.

There are (according to some authorities) thirteen segments in a larva, the head being included as the first seg. Two spiracles (one each side) in each seg. except the first, third, fourth and last or thirteenth seg. Six true legs on the anterior segs., and in butterfly larvæ eight prolegs on the mid-segs., with a pair of claspers on the last seg. The larva of *Euploea midamus*, Fig. 3, Pl. 1a, shows plainly the number of segments and spiracles. The last or anal segment of larvæ is so much altered and modified for special purposes that it is very difficult to ascertain the true number of segments in a lepidopterous larva. Some authorities say there are thirteen segments exclusive of the head, which says Sharp, should not be reckoned as a segment, as it is composed of several pieces. In "Butterflies of Hongkong" I have reckoned thirteen segments, including the head as the first segment.



GLOSSARY OF TERMS.

- Anal claspers, the last pair of abdominal legs in a larva.
Androconia, specialised hairs and scales, supposed to exhale scent.
Armature, the genitalia.
Articulation, a joint ; the apparent joint between two segments of a larva.
Axially, in a line with the longer axis.
Bifid, cleft in two.
Chitinous, hard or horny like chitin, a substance entering largely into the composition of the cuticle or exoskeleton of insects.
Ciliae, the fringes of the outer margins of the wings.
Crepuscular, affecting the twilight.
Dimorphic, having two different forms.
Filament, a thread-like appendage or organ.
Fusiform, spindle-shaped ; thickest at the middle, tapering to each end.
Hyaline, transparent or glassy.
Imago, the perfect insect. Pl. imagines.
Interspace, the space between two wing nervures or nervules.
Irrorated, finely sprinkled with minute dots.
Limaciform, slug-shaped.
Lunule, a crescent-shaped marking.
Maculated, spotted.
Neuration, the system of nervures and nervules of the wings.
Nuchal, belonging to the nape of the neck.
Ocelli, the simple eyes of larvæ, etc.
Ocellus, an eye-like spot or marking.
Osmeterium, the nuchal horn of *Papilio* larvæ ; also present in certain moth larvæ.
Process, any projection or protuberance.
Prolegs, the fleshy abdominal legs of a larva.
Proboscis, of a butterfly, the greatly modified maxillæ or jaws.
Pubescent, covered with fine, short hairs.
Reticulated, netted ; like the meshes of a net.
Spiracle, a breathing-aperture leading to the tracheæ.
Subulate, awl-shaped ; of cylindrical section, but tapering from one end to the other.
Sub-, rather or somewhat ; as sub-angular = rather angular.
Suture, the inverted V-shaped apparent articulation down the face of a larva.
Thoracic, belonging to the thorax.
Tracheæ, the breathing-tubes or respiratory system.
Truncate, abruptly cut off.

ERRATA.

- Page 13, line 17 from bottom, for "*a ♂ var. godarti*" read "*a ♀ var. godarti*."
- Page 20. In the "Introduction to the Modern Classification of Insects" the late Professor Westwood stated that the insect eaten in large quantities by the Australian aborigines was a species of *Euploea*. It appears, however, from a communication of Dr. F. A. Dixey to the Proc. Ent. Soc. of Lond. for 1904, that this is an error, and that the insect in question is a moth.
- Page 29, line 10 from top, for "*heterogenous*" read "*heterogeneous*."
- Page 30, under *Cirrochroa satellita*, for "*Honkong*" read "*Hongkong*."
- Page 48, line 8 from top, for "*carcass*" read "*carcase*."
- Page 52, for caption "*Limenitis camilla*, Linn." read "*Limenitis sibylla*, Linn." Line 7 from top for "*L. sybylla*" read "*L. sibylla*." Professor Poulton says this species is certainly *L. sibylla*, the English "White Admiral." On Pl. VI Explanatory page for "*4. Limenitis camilla*" read "*4. Limenitis sibylla*."
- Page 71 for caption "*Zizera maha*, Kollar," read "*Zizera otis*, Fabr." Line 11 from bottom delete "Fig. 3, Pl. Va, is a remarkable variety," *et seq.* Line 6 from top for "*Z. maha*" read "*Z. otis*."
- Page 72, lines 3 and 4 from top for "*Z. maha*" read "*Z. otis*." On Pl. VIII Explanatory page for 26 and 28 "*Zizera maha*" read "*Zizera otis*."
- Page 77 for caption "*Curetis dentata*, Moore," read "*Curetis acuta*, Moore," and on Pl. VIII Explanatory page for 6 and 9 "*Curetis dentata*" read "*Curetis acuta*." To the last line under *Pratapa deva* on p. 77, add "Fig. 9, Pl. IX is from a ♂ taken in August, showing the upperside only."
- Page 80, bottom line, delete "Fig. 9, Pl. IX the upperside of a ♂ taken in August, with a broader black margin," and on p. 81 top line delete "on the hindwing than usual." On Pl. IX Explanatory page for "*9. Tajuria cippus*" read "*9. Pratapa deva* ♂, Moore."
- Page 81, in footnote, for "*immeditaely*" read "*immediately*."
- Page 97, line 6 from top, for "*Fig. 13, Pl. IX is from a ♀ taken in May*" read "*Fig. 13, Pl. IX is from a ♂ taken in May*."
- On Pl. XIII Explanatory page add "*9. Catopsilia pyranthe* ♂."
- Page 98, line 9 from top, *et seq.*, on glandular hairs of larva of *Terias*, see Appendix.
- Page 102, line 21 from bottom, for "*settles with close wings*" read "*settles with closed wings*."
- Page 114, line 8 from bottom, for "*Annona reticulata*" read "*Anona reticulata*."
- Pl. XIV Explanatory page, for "*27 Baoris colaca*" read "*27 Parnara colaca*."
- Page 144, line 12 from bottom, for *Curetis dentata* read *Curetis acuta*.

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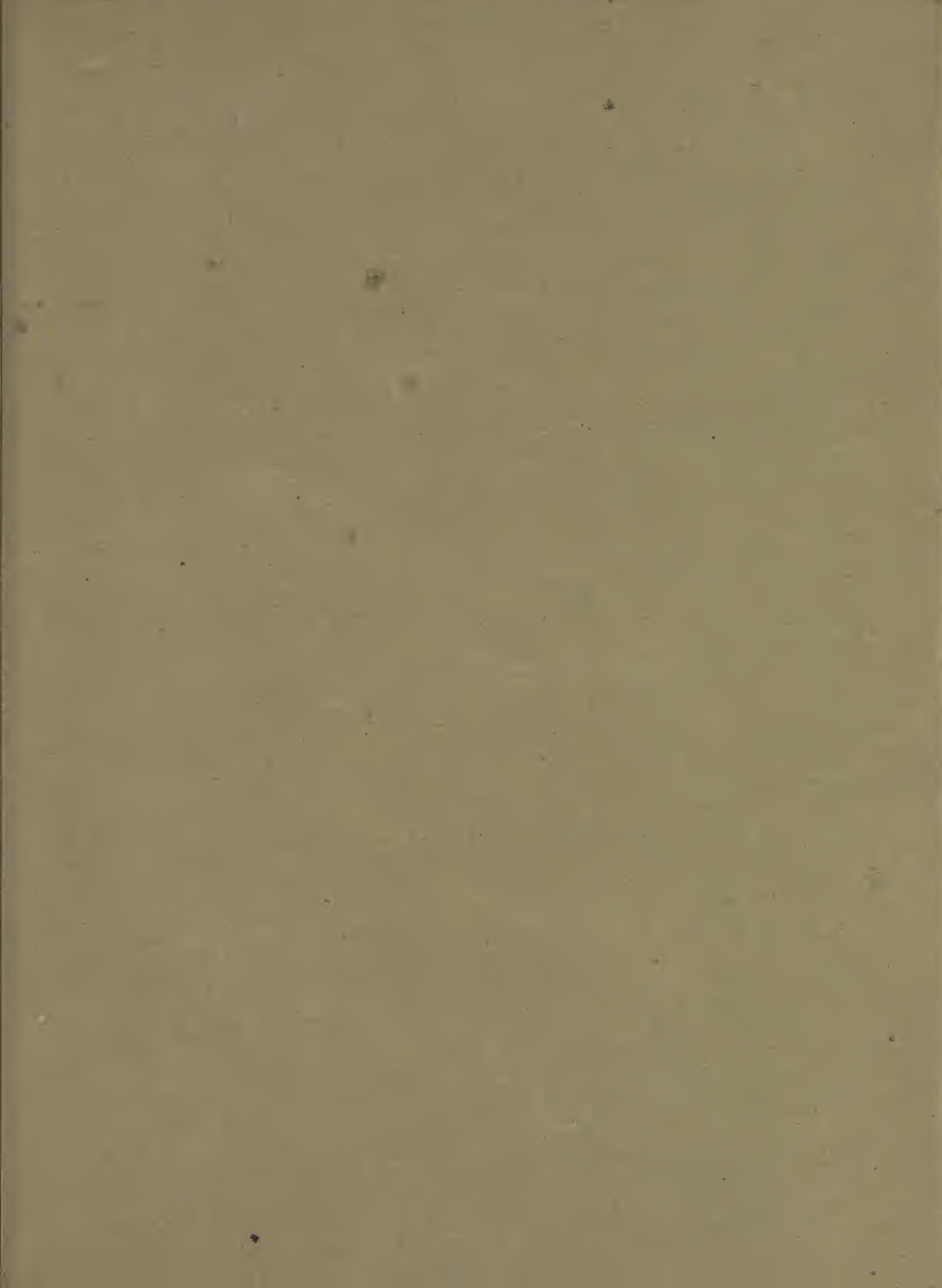
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THE END.



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